W hite Paper

Z1010

Sony Ericsson's first dual mode 3G product

Sony Ericsson

Preface

Purpose of this document

This White Paper will be published in several revisions as Z1010 is developed. Therefore, some of the headings and tables below contain limited information. Additional information and facts will be forthcoming in later revisions.

The aim of this White Paper is to give the reader an understanding of 3G network technology and its main applications, as well as the main functions and features of the Z1010.

People who can benefit from this document include:

- Operators
- Service providers
- Software developers
- Support engineers
- Application developers

More information, useful for product, service and application developers, is published at www.SonyEricsson.com/developer/, which contains up-to-date information about technologies, products and tools.

Online Developer Resources

On www.SonyEricsson.com/developer, developers will find all documentation and tools such as phone White Papers, Developers Guidelines, SDKs and APIs etc. The developer Web site also contains discussion forums monitored by our Sony Ericsson Developer Support team, a searcheable Knowledge Base of support queries and solutions, Tips & Tricks, example code etc. To stay up to date on development issues, register and subscribe to the monthly Sony Ericsson Developer Newsletter.

Sony Ericsson Developer Support

Sony Ericsson offers developers professional technical support services. The service can be purchased from the developer web portal, as part of the Sony Ericsson Core and Core+ membership package or as individual support incidents. There are two levels of support, described below.

The **Basic E-mail Developer Support** is an annual support service included in the Core membership that provides developers with all the basics to successfully develop world-class applications for Sony Ericsson products. With this support contract, developers get access to Sony Ericsson developer support engineers via e-mail with same-day response, five technical support incidents as well as the ability to purchase more.

The **Priority E-mail Developer Support** is an annual support service included in the Core+ membership that equips professional developers with everything they need to successfully develop world-class applications for Sony Ericsson products. With this support contract, developers get priority access to Sony Ericsson developer support engineers via e-mail with fast response times and up to 50 technical support incidents.

Document conventions

The Z1010 has a full graphic screen which supports 65,536 colours, referred to as *65k*.

The screen images in this document are in JPG format and are thus of a lower resolution than the images actually shown on the Z1010 screen.

The Picture Messaging feature is referred to as *MMS* (Multimedia Messaging Service) throughout this document.

April 2004

Document history

2003-02-26	Version R1A	First released revision.
2003-10-03	Version R2A	Second released revision. Much info updated, for example DRM, Bluetooth, WAP, Java, SMS, SyncML. Terminology updates. More pictures added.
2004-04-07	Version R3A	Third released version.

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April 2004

Product overview

With the Z1010, Sony Ericsson takes a giant step into the communications future of multimedia, imaging and entertainment. Sony Ericsson also combines the latest messaging and connectivity technology with the newest entertainment features. With Sony Memory Stick Duo for storage of content such as pictures, audio and video clips, twin cameras and a 65k colour screen, this mobile phone is trendsetting for pioneers of new technology and applications.

The Z1010 is a dual mode mobile phone, supporting WCDMA (Wideband Code Division Multiple Access) as well as GSM (Global System for Mobile Communications) and GPRS (General Packet Radio Service) dual band 900/1800, GPRS 4+1. It supports voice, circuit switched (cs) data and packet switched (ps) data.

Key functions and features

The Z1010 is the first Sony Ericsson 3G product. The evolution of mobile communications towards 3G will greatly increase the scope for new applications and services. 3G brings multimedia into mobile phones, and it is in this area that Sony Ericsson can show its vast experience in consumer electronics and entertainment – music, pictures and games – as well as its mobile technology leadership.

The most eye-catching feature of this phone is its large colour screen. It measures 176 pixels wide and 220 pixels high (176 x 220) and has 65,536 colours, allowing high-quality colour imaging and video. The phone has a loudspeaker mode and allows the connection of a high-quality stereo headset. The phone has an appealing design, with the form of a clamshell and a second display that is visible even when the phone is closed. Being a 3G mobile phone, the Z1010 is compliant with the 3GPP R99 December 2002 release.

The Z1010 is a dual mode (WCDMA and GSM-GPRS) mobile phone. It supports handover (GSM–UMTS, UMTS–GSM) and simultaneous sessions (one voice and one packet data session or two packet data sessions).

3G

3G is going to be the catalyst for a whole new set of mobile services, enabling you to access advanced services anywhere, anytime. You will be freed from the confines of cables, fixed access points and low connection speeds and you will have access to entertainment and on-demand services to a much greater extent than before.

Multimedia (streaming and download)

By streaming media such as audio and video clips, multimedia is available to you in realtime with minimal downloading or waiting time. You can also download media and save it in the phone memory or on the Memory Stick Duo, and then use the Media player to play back audio and video clips whenever you want.

Media player

The Media player makes the Z1010 a portable MP3/MPEG4 player. You can play music, listen to streamed or downloaded music files and video clips. You can also view video clips that have been stored in the phone.

Twin cameras

The Z1010 comes with two cameras:

VGA camera

With the VGA camera, you always have the camera with you. You just take a picture and send it away as part of a multimedia message or as an e-mail attachment. You can also record your own video clips and send them to your friends.

Video Call camera

With the video call camera, placed below the full graphic 65k colour screen, you can participate in a video call with your friend. While the video call cameras of the phones are capturing you and your friend, you can see the person you are talking to, and that person can see you. During a video call, it is possible to switch between the video call camera and the VGA camera. This allows you to enjoy the benefits of both cameras during the call.

QuickShare™ Sony Ericsson's constant ambition of making products easier to use, has had a great outcome: QuickShare™.

QuickShare is the fastest, easiest and smartest ever way to share images. With minimal hassle and just a few clicks, you are now able to share moments captured with the integrated camera, with your friends!

But there is more to QuickShare than sending images with a picture or e-mail message. QuickShare is about ease of use of all the imaging features of the product. Since the Z1010 supports Bluetooth, you can share images phone to phone

across the room or between your phone and other paired devices such as printers, PDAs or PCs. So there is nothing to stop you printing a picture directly from your phone using a Bluetooth enabled printer.

Full graphic 65k colour screen

The large colour screen, 176 x 220 pixels, of the Z1010 enhances viewing, facilitating high-quality multimedia and entertainment. From standby, the phone features a user interface built on the "desktop" concept, which is widely used in many computer operating systems. From here, navigation between different main functions in the phone is done by selecting the icons representing these functions.
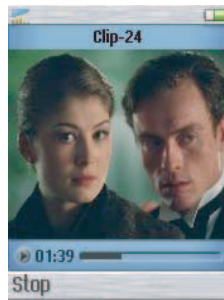
Second display

To provide convenient access to different types of information even when the phone is closed, the phone is equipped with a second display, placed on the outside. The information in the display is conveyed by icons and text. Typical information that would be displayed includes:

• Signal strength
• Time and date
• Battery status
• CLI (Calling Line Identification)
• Messaging and other alerts
• Song titles

The second display measures 101 x 80 pixels and is grey scale. For convenience, the display has a backlight that lights up at incoming calls and alerts, and allows a quick glance at the display information.

Sony Memory Stick Duo

The Z1010 supports Sony Memory Stick Duo. The user can store different kinds of content (pictures, audio, video clips etc.) on the external memory, and transfer the content to other Sony Memory Stick-compatible consumer products, for example Sony digital cameras, camcorders, portable music players, TVs, photo printers, Playstation 2 and computers.

MMS

Reacting to the enormous popularity of mobile phone messaging, Sony Ericsson has incorporated the latest messaging standard into the Z1010, along with a colour screen for an enhanced imaging experience.

Say it in words, say it with pictures, animate it, add sound. Multimedia birthday and holiday greetings are great fun to put together using the Z1010. On vacation, use your mobile phone to send a digital postcard with stylized text, digital pictures of where you are, and authentic sound clips, to friends and family back home. If, when shopping, you find something a friend might like, you can instantly send a digital picture of the item and ask if they like it.

With MMS, you can subscribe to many interesting applications, for example, stock information, movie trailers and weather reports.

Pre-play

Content such as music, video and images may be previewed before purchase.

User experience

A unique direct-link to download music, video, games, themes and images, which is easy to use and promises you best-selling content for mobile download.

By pressing the Pre-play icon on the phone desktop, you can, for example, go straight to a live list of Top Music Hits. Choose a song, listen to it, and if you like what you hear, you can buy it and add it to Sounds. You can then listen to it or use it as often as you want.

Content formats that are supported

All formats that are supported in the phone will be possible to download. Music, video and images may be previewed before purchase.The music format is MIDI, MP3, WAV or AAC-LC (Polyphonic 72 voices).

How the service works

This service is owned by Sony Ericsson or hosted by Sony Ericsson for a network operator. The pre-play or other premium content is maintained and managed, for example by Sony Music or Sony Pictures. The content on offer can easily be suited to a specific region or operator.

Implementation costs for network operators are minimal and server communication is based on existing, well-established standards. Sony Ericsson offers first or second line support according to the agreement on hosting a white label service or not. High level co-operation is available for the design, look and feel, of content management.

Operator benefits

This service is aimed at providing quality and quantity revenue for network operators. This is truly an APRU driver with low costs for operators. The process involves:

- Downloading a list
  - Previewing content
  - Choosing content
  - Buying content

Note: The availability of this unique application is limited to specific markets, where relevant infrastructure and agreements have been set up.

Other technical details

Security - Server communication is protected by TLS.

Forward lock - Content cannot be exchanged with other devices by the user, it is limited to use or delete.

Java™ 2 Micro Edition

With Java, you can download extra content, for example, new information- and entertainment-based applications. This gives users a chance to personalize the functions and features in their phones, and developers the opportunity to create new applicatons.

Gaming

Gaming is already a very popular feature in mobile phones, and with Java, users can add new games and skill levels to further enhance the entertainment value of Sony Ericsson phones.

Bluetooth™ wireless technology

Using built-in Bluetooth wireless technology, the Z1010 can communi-cate with other Bluetooth devices via a radio link instead of a cable. Unlike infrared, Bluetooth wireless technology is not dependent on line-of-sight communication.

A device connected to this phone using Bluetooth wireless technology can be up to 100 metres away. With a Bluetooth headset, you can answer your phone when it rings, no matter where it is. The phone could be in your briefcase, your coat pocket or even in another room. Two mobile phones, or a phone and a computer, with Bluetooth wireless technology can exchange data such as images, video clips, business e-cards, music files and calendar data.

Copyright protection – DRM

DRM (Digital Rights Management) assures the rights and copy protection of downloaded content (audio, pictures, ringtones, video, entertainment features such as games etc.).

As content-based services have great market potential, and to encourage the use of this content, Sony Ericsson supports DRM in all multimedia products to come. Sony Ericsson regards DRM as a key enabler for content-based services, and supports the ongoing standardization work/activities of the OMA (Open Mobile Alliance), as well as taking additional market requirements in this area into account.

More in-phone functions

Usability

Navigation key
The Z1010 has an easy-to-use 4-directional + select navigation key. Using your finger or thumb, you can easily navigate the menu system. In a menu, when you arrive at the function you want to use, gently press the navigation key to select the feature.

Improved MMI
A new significantly improved MMI is introduced, with selection keys and a key assignment that gives a very efficient interaction design, and full flexibility to handle all the new features and applications. User-centred design and extensive usability testing has solidified the new MMI paradigm, and ensured its visibility (in actions and system status) and consistency (between applications and for similar actions). The extra large, high-resolution colour screen is easily navigated with the navigation key. With the second display only a quick glance is needed to give you status and message info when you are on the move. And you can get started immediately - the Z1010 is ready to go

Polyphonic sounds - 72 voices
Polyphonic sounds and the MIDI format mean a revolution to the sound quality of the ringtones in this phone. With this format, the user can play, compose, edit and send melodies by using the Music DJ. The synthesizer in the Z1010 uses wavetables, real instrument sounds, with 72 voices polyphony. The new composer has an improved graphical user interface to simplify melody handling. All new and edited melodies are stored in MIDI format.

File management
The Z1010 has a file manager, similar to that which can be found on many computers. In the file manager the user has an overview of the contents of the phone as well as how much memory is allocated to each function and feature. The user can also see if the contents are stored in the internal memory (phone memory) or the external memory (Sony Memory Stick Duo), and can transfer content between the two.

GPRS (General Packet Radio Service)
GPRS uses Internet-style packet-based technology. It lets you be more or less permanently connected to the mobile Internet, but only uses the radio link for the length of time it takes to transfer data. GPRS offers the user the speed needed for satisfactory mobile Internet usability. The Z1010 supports GPRS 4+1.

WAP 2.0 supporting XHTML™
The WAP browser supports the markup languages of WAP 2.0 – XHTML Mobile and XHTML Basic. These two subsets of the Web standard XHTML are supported by all major Web browsers. An XHTML page can be viewed in both the WAP browser and in any standard Web browser. All of the basic XHTML features are supported, including text, images, links, check boxes, radio buttons, text areas, headings, horizontal rules and lists.

In addition to XHTML, the WAP browser supports WML. The user can navigate between WML and XHTML pages. WAP 2.0 in the Z1010 also supports cookies, often used by Web sites to store site-specific information in the browser between visits to the site. Cookies are often used by e-commerce sites (in shopping carts and wish lists for example), and to save the user from entering the same information more than once.

My friends

Sony Ericsson's application - My friends - is an enhanced messaging facility that offers a user friendly and versatile way to quickly get in touch with contacts.

The My friends application merges the Phonebook and messaging functionalities that we commonly find in phones. At a click you can access your list of contacts, and with another click you can choose how you want to communicate with them - via SMS, MMS, e-mail or chat.

The application also enables you to view the 'presence', or availability of the contacts in My friends. You can easily and quickly find out whether they are in a meeting or free to speak to you. You can then choose how you wish to contact them.

My friends contains all the information you need about your contacts.

You can have:

- a select list of up to 20 people
- their contact information such as phone number, e-mail, chat and mail addresses
- call information - calls to and from them
- presence information - their availability, online status (on or off), text or image they choose to show you.

You can present similar information about your own availability and status.

You have access to chatrooms, and can form wireless communities of business associates or contacts.

The main view
You can access the My friends sub-menu by clicking the Messaging desktop icon. The icon in the status bar indicates the online status of the chosen friend in the list, and indicates new, unread messages if any. The most likely action (which is context dependent) is available on the left softkey.

Additional actions become available to you when you press the More key.

Adding contacts to My friends
You can add a contact from the Phonebook to the My friends list, and you can change the position of the friend in the list. This enables you to have your list of immediate business or social contacts at hand, so you can establish easy communication with them almost instantly.

Note: To realise this application's complete potential, access to a Wireless Village server is required.

Managing My friends
Your list of immediate contacts may change to suit business demands. You may need to interact with new sets of people depending on your current project or work at hand. Or you may simply want to alter your list of personal friends whom you want to keep in constant touch with.

You can manage the My friends list to quickly alter the list of contacts that you want displayed. You can sort the names, edit nicknames, block or delete friend, or link a friend to Phonebook.

Viewing the status of contacts in My friends
You can view your contact's status and decide how you want to communicate with him or her. You may want to call or send an SMS, MMS, or e-mail, or join your friend in a chatroom.

Access to the chatroom
The My friends application supports creating chatrooms and inviting your friends (on your My friends list) to the chatroom. You can bookmark associates you would like to chat with. The application can establish connectivity between different service offerings that enable chat between terminals.

E-mail
With inbox, outbox, save draft and reply options, you have all the functions you need for effective e-mail communication in a powerful mobile phone. Constantly connected to a POP3, SMTP or IMAP4 e-mail server anywhere on the Internet, your Z1010 stores messages dynamically, depending on available memory, and updates your inbox automati-

cally and over the air. Check your e-mail anywhere. Reply to e-mail on the move. Friends, family and business contacts know that when they send you e-mail, you can receive, read and act on it immediately. You can include pictures in outgoing e-mails and receive attachments. Hyperlinks in e-mails are supported.

Personalization

With themes, the user can change many settings in the phone, for example colours, images and ringtones, making it more personal. The phone comes with a number of preloaded themes and pictures, and more can be downloaded and exchanged – sports, movie, seasonal and other themes will be available on Sony Ericsson or operator sites. Other personalizable features are the start-up picture and the screen saver. You can also set specific pictures and ringtones for each separate name you have in your phonebook.

Technologies in detail

3G

Mobile telephony allowed us to talk on the move. The Internet turned raw data into helpful services that people found easy to use in their everyday lives. Now, these two technologies are converging to create third-generation mobile services.

In simple terms, 3G (third-generation) services combine high speed radio access with IP (Internet Protocol)-based services. This does not just mean fast mobile connection to the Web, it means totally new ways to communicate, access information, conduct business, learn and be entertained. It promises liberation from slow, cumbersome equipment and immovable points of access.

Increased 3G data rates, together with extended multimedia and entertainment content, will enhance the use of mobile Internet in a revolutionary way. Gaming, and the ablility to store content externally with Sony Memory Stick Duo, will increase the user benefits even more.

The step towards IP is vital. IP is packet-based, allowing users to be "on line" at all times, having to pay only for the sent or received data. The connectionless nature of IP also makes access a lot faster: file downloads take less time and we can be connected to a network within a few seconds.

3G introduces wideband radio communications, with incredible access speeds. Compared with today's mobile networks, 3G will significantly boost network capacity, much needed in densely populated areas – thus operators will be able to support more users, as well as offer more sophisticated services.

The Z1010 is a dual mode phone. Thus the user will be able to use his or her Z1010 without having to think about which system is being used – the handover between the two systems is going to be seamless.

Using 3G scenarios

3G will change our working habits and social lives in many ways. The services that 3G has to offer will help us to manage our personal information, simplify tasks such as grocery shopping, make better use of our time, and offer services that are just fun to use. 3G will also help new, flexible working practices, such as working from home and remote access to corporate networks outside traditional working hours. Operators will be able to develop innumerable new service opportunities to attract and retain new customers:

- Business people can use the time they spend travelling, fixing things that are usually hard to get time for, for example to log on to their bank account, check the balance and pay a few bills - all through their 3G device.
- On vacation, people can make reservations when they get to their destination by using their 3G handset to obtain up-to-date information, including hotel vacancies. Having booked a room, they can use their phone to view video clips of local tourist attractions and talk to someone from the local tourist information bureau at the same time.
- Anyone wanting to hire a film, or go to the cinema can quickly download a trailer to decide which film they want to see.
- People travelling on business can use their 3G mobile phone to hold a phone meeting with their colleagues and, at the same time, view the draft presentation and make changes on line.
- A maintenance engineer, repairing some equipment at a client's premises, has a problem. Using his 3G mobile phone, he can contact his department and then download a demonstration video that guides him through the repair process.
- People can easily share a moment with their friends and family in other geographical sites by capturing the moment with the video recorder and then sending them the video clip in a picture message.

Multiple sessions

With regard to simultaneous connectivity, multiple sessions, Sony Ericsson supports the 3GPP specification 3GPP TS 22.101 which states that 3GPP specifications shall enable the user of a single terminal to establish and maintain several connections simultaneously. It shall efficiently cater for applications which have variable requirements relating to specific QoS (Quality of Service) parameters (for example throughput) whilst meeting other targets."

Examples of use cases in 3G mode
- One voice and one packet data session:

Photo: A voice call is connected, a photo is taken with the integrated camera and sent, either via MMS or via e-mail.

- Two simultaneous packet data sessions:

Streaming: A WAP browsing session is ongoing, an audio or video clip streaming session is started, for example from a "hyperlink".

Gradual change and development of 3G

The third-generation is a technology shift taking mobile telephony to a higher level. The term describes a new generation of wireless systems that offer services and functions far beyond the era when mobile phones were used for voice calls only.

When taking GSM customers into the world of 3G, operators will not have to switch their networks from one system to another. The move from 2G to 3G optimizes the existing infrastructure, enabling it to co-exist with the new WCDMA system.

GSM equipment – enhanced with GPRS – and its functions will continue to exist within the 3G system. Old and new technology will complement eachother and form a highly flexible network system, with a capacity that gives new meaning to mobility.

GSM and WCDMA development

Building the network
The combining of GSM with GPRS, and the introduction of WCDMA technology in a new spectrum, can be done gradually. The new wideband technology can be deployed in parallel with the enhancement of the existing spectrum, re-using parts of the GSM infrastructure.

Even when WCDMA is fully expanded, GSM-based parts of the network will continue to play a crucial role in serving the operators' needs for capacity. All spectrum assets will be valuable, as there will be a

substantial increase in both the number of subscribers and the volume of traffic in the networks. With a seamless solution, operators will have a flexible network where the systems interact according to current demand.

User experience
For the consumers, using a network consisting of GSM, GPRS and WCDMA parts will be a seamless experience. GPRS allows qualified mobile Internet applications, while the introduction of WCDMA brings a whole new set of user services, using the full potential of wideband data transport.

How 3G works

3G brings together two powerful forces: wideband radio communications and IP-based services. Together, these enable advanced multimedia services.

Making 3G a reality depends on technology developments in different areas. These include amendments to the radio interface to support wideband communications, as well as amendments in the core network. Supporting technologies such as WAP, Bluetooth wireless technology, Java, MMS and streaming, are also important.

GPRS
Short for General Packet Radio Service, GPRS is a standard for wireless communications which runs at speeds up to 115 kbps, compared with current GSM systems' 9.6 kbps.

GPRS provides packet data, rather than circuit switched data. This means that as a user you pay for data sent and received, and not for time spent online. There is, more or less, a permanent connection at all times.

GPRS is implemented by adding new packet data nodes and upgrading existing nodes, to provide a routing path for packet data between the mobile terminal and a gateway node. The gateway node will provide interworking with external packet data networks for access to the Internet and intranets.

Benefits
- Faster data speeds and "permanent connection" mobility.
- Instantaneous connection set-up.
- Connection to an abundance of data sources around the world, through support for multiple protocols, including IP.

WCDMA
WCDMA (Wideband Code Division Multiple Access) is a wideband radio technique that provides far higher data rates than other radio techniques available today, up to 2 Mbps, and highly efficient use of radio spectrum.

The higher bandwidth that WCDMA provides will deliver the full potential of 3G. For example, WCDMA allows simultaneous access to several voice, video and data services.

WCDMA is fully compliant with IMT-2000 (International Mobile Telecommunications-2000) and is the air interface technology for standards in the 2 GHz bandwidth (the IMT-2000 core band), known as UMTS (Universal Mobile Telecommunication System) in Europe and ARIB (Association of Radio Industry Businesses) in Japan.

UMTS
UMTS and WCDMA are often used as synonyms. The European Telecommunications Standard Institute (ETSI) chose the name UMTS to define the system when positioned in the 2.1 GHz band, which will be the case in Europe and other parts of the world where this frequency is available. In the Americas though, WCDMA will have to use other parts of the frequency band.

UMTS is part of the International Telecommunications Union's IMT-2000 vision of a global family of 3G mobile communications systems. UMTS includes WCDMA radio access technologies together with a core network specification based on the GSM/MAP (Mobile Application Part) standard. Please visit the 3GPP site for more information at www.3gpp.org.

Handover/service continuity

The scope of this text includes service requirements for handover maintaining continuity of service to a wireless terminal, as it moves between the radio coverage area, or "cells", associated with different base station sites. This functionality is called "handover". It is a key requirement to allow for dual or multi-mode terminals to handover traffic from UTRAN to other radio systems such as GERAN and vice versa.

This part describes the general principles for service continuity within UMTS Radio Access Network, within GSM/GPRS and between UMTS Radio Access Network and other radio systems such as GSM/GPRS. As a principle, the requirements on service continuity characteristics should be according to the target network on which the service is maintained.

Service continuity
Service continuity should support the following scenarios:

- Continuity of active circuit switched services when moving within UMTS Radio Access Network, within GSM/GPRS and between UMTS Radio Access Network and GSM/GPRS coverage areas.

- Continuity of active and packet switched sessions when moving within UMTS Radio Access Network, within GSM/GPRS and between UMTS Radio Access Network and GSM/GPRS coverage areas.

General operational considerations
Mechanisms defined to support service continuity between different radio systems or radio access modes should effectively cope with a number of coverage scenarios:

- Limited coverage in a "sea" of coverage provided by another radio system or radio access mode.
- Selective operation at a geographical boundary, with extensive UMTS Radio Access Network coverage on one side, and extensive coverage from another radio system on the other side.
- Geographically co-located areas of UMTS Radio Access Network coverage and another radio system.

Performance requirements

Temporary degradation of service caused by handover
During intra-UMTS Radio Access Network handover or handover from UMTS Radio Access Network to GSM/GPRS, degradation of service should be no greater than during intra-GSM/GPRS handover.

The duration of the discontinuity experienced by packet switched and circuit switched real time services should be shorter than that in the handover of voice calls over GSM/GPRS.

Requirements on multiple bearer services handover from UMTS Radio Access Network to GSM/GPRS
Consideration must be given to services that may involve multiple bearer services (and simultaneous sessions). The mapping between UMTS Radio Access Network bearer services and GSM/GPRS bearer services depends on many factors such as data rate, delay constraints, error rate etc. In the event that certain UMTS Radio Access Network bearer services cannot be handed over to GSM/GPRS, the handover of some of the bearers to maintain the service should not be precluded.

In the case where a user equipped with a dual mode terminal is in UMTS Radio Access Network coverage, and has multiple PDP contexts activated (for instance to support multimedia), then it is preferable to handover one PDP context, rather than dropping all of them.

As a first priority only the PDP contexts which have an associated QoS that can be supported by the GSM/GPRS should be candidates for handover.

If there are still multiple PDP contexts as "handover candidates", then the operator should choose which PDP is maintained. When roaming, the serving network should make this decision. The operator may choose to either:

- Drop all of the PDP contexts.
- Choose one based upon criteria such as duration, amount of traffic transferred, etc.

Handover in the Z1010

This phone is compliant with the 3GPP R99 December 2002 release.

GSM/HSCSD to UMTS
The phone supports circuit switched data handover from GSM/HSCSD to UMTS.

UMTS to GSM/HSCSD
The product supports circuit switched data handover from UMTS to GSM/HSCSD.

GSM/GPRS to UMTS
The product supports packet switched data handover and circuit switched voice handover from GSM/GPRS to UMTS.

UMTS to GSM/GPRS
The product supports packet switched data handover and circuit switched voice handover from UMTS to GSM/GPRS.

Positioning

The basic cost efficient positioning method available in both 2G and 3G networks, relies on measuring round trip time. In 2G it is called Cell-ID + TA and in 3G Cell-ID + RTT. In 3G networks it will be more accurate than in 2G due to smaller steps in round trip time and the fact that measurements from 2 cells can be obtained during soft handover.

To obtain a more accurate position time difference measurement, involving several base stations can be used.

These positioning methods are already used to support location based information services such as Yellow pages, restaurant guide, traffic information, directions and friend finder applications. Typically WAP, SMS or voice has been used as delivery mechanisms, Java and MMS will add new possibilities to deliver attractive location based applications.

GPRS

The introduction of GPRS was a big step in the evolution of the GSM networks for enhancing the capabilities of data communication. Data traffic has increased (over both wired and wireless networks), with the growth in demand for Internet access and services paralleling that of mobile communications.

We can now see that the demand for high-speed Internet access is the key driver for coming generations of wireless multimedia and entertainment services, and GPRS is important as a stepping stone when we enter the 3G network era. GPRS has allowed innovative services to be created and granted access to new and previously inaccessible market segments, which will be further developed with 3G.

GPRS is able to take advantage of the global coverage of existing GSM networks. Applications developed for GPRS have been deployed on a large scale and have thus reaped the associated benefits.

With GPRS, the Z1010 sends data in "packets" at a very high speed. The Z1010 remains connected to the network at all times, using transmission capacity only when data is sent or received.

Instead of occupying an entire voice channel for the duration of a data session, the Z1010 sends and receives data in small packets, as needed, much like IP on the Internet. Thanks to this, the phone is always online, using transmission capacity only when data is sent or received. The Z1010 is compatible with GPRS R99.

The GSM system limits the ability to use all eight time slots, so the Z1010 uses up to four time slots for receiving data, and one slot for transmitting.

Information about the identity of the phone and the characteristics of the connection are described in the PDP (Packet Data Protocol) context. This information is stored both in the phone and in the mobile network, so that each phone is identified and "visible" to the system.

Using GPRS with the Z1010 has many advantages, for example:

- Constant connection
  Keep an open connection to an e-mail system or the company network, staying online to receive and send messages at all times. All connection settings can be managed by using the data connections feature.
- High speed
  Gain access automatically to increased bandwidth when downloading large files, images etc.
- Cost efficient
  Use transmission capacity only when needed, thus reducing costs.
- WAP over GPRS
  Access the Internet via WAP at high speed and with a constant connection.
- E-mail over GPRS
  Remain connected to an e-mail system while reading and preparing messages, (which are then sent at high speed).
- Data communication
- Transfer data and access the Internet or an intranet with a PC, PDA or handheld device connected via Bluetooth wireless technology, infrared or cable.
- Data and voice
  Maintain a data connection when conducting a voice call.
- Provide settings

Receive GPRS configuration settings from the provider OTA (over the air), making manual configuration unnecessary.
- User-controlled settings
  Take advantage of full user control in the data connections menu, establishing multiple descriptions and accessing advanced settings for GPRS.

Standards, architecture and protocol

The architecture, protocols and codecs for PSS (Packet Switched Streaming) follows the 3GPP specifications to ensure interoperability between business solutions. Sony Ericsson fully supports the 3GPP standard, but will also meet the market requirements of supplementary formats and codecs.

Sony Ericsson Applications

Synchronisation

Spatial layout

Capability Exchange | Session Establishment | Session Control | Scene Description | Speech Decoder | Audio Decoder | Text | Vector Graphics Decoder | Image Decoder | Video Decoder

Packet based network interface

3GPP L2
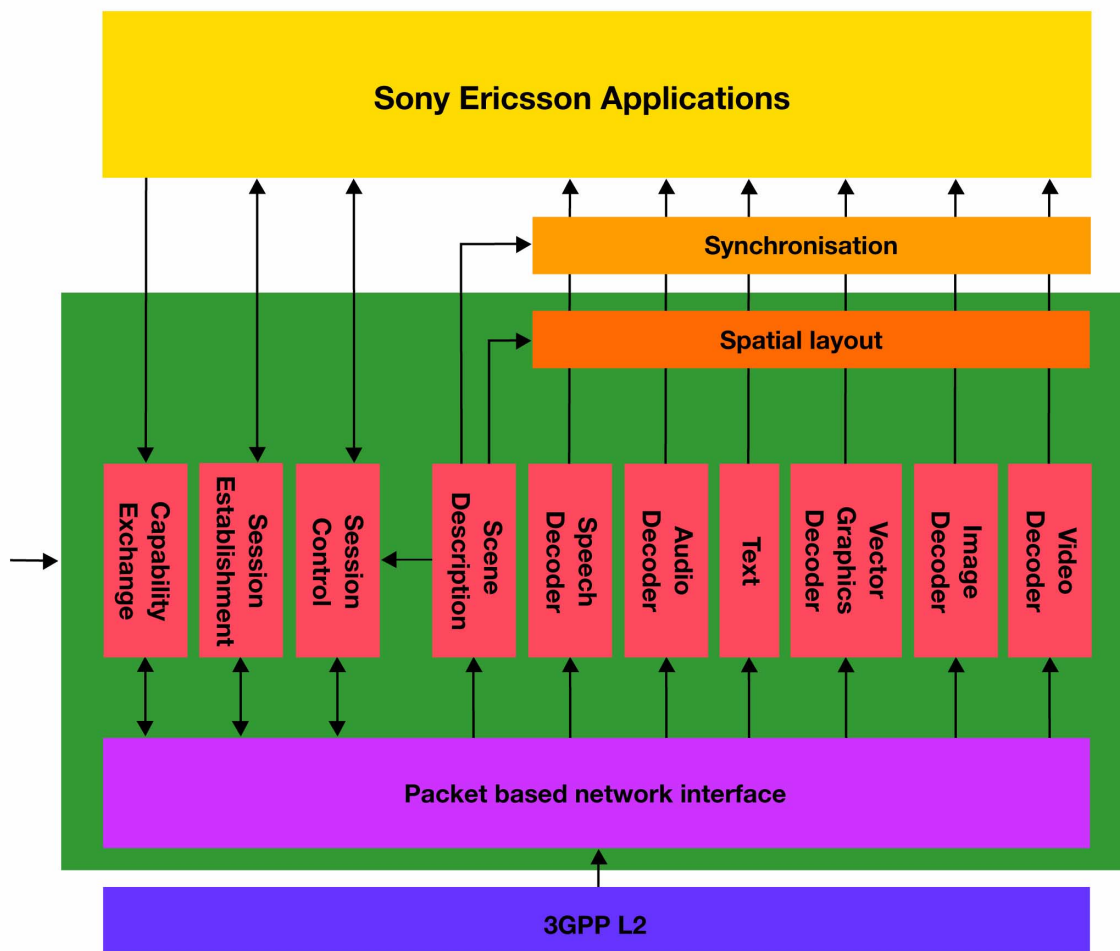
Figure 1. Functional components of a PSS client

Figure 1 shows the functional components of a PSS client. Figure 2 gives an overview of the protocol stack used in a PSS client and also shows a more detailed view of the packet based network interface.

The functional components can be divided into control, scene description, media codecs and the transport of media and control data. TS 26.233

"Transparent end-to end packet switched streaming service (PSS); General description" defines the simple and extended PSS.

The control-related elements are session establishment, capability exchange and session control.

• Session establishment refers to methods of invoking a PSS session from a browser or directly by entering an URL in the user interface of the terminal.

- Capability exchange enables choice or adaptation of media streams depending on different terminal capabilities.
- Session control deals with the set-up of the individual media streams between a PSS client and one or several PSS servers. It also enables control of the individual media streams by the user. It may involve VCR-like presentation control functions like start, pause, fast forward and stop when presenting media.

The scene description consists of spatial layout and a description of the temporal relation between different media that is included in the media presentation. The first gives the layout of different media components on the screen and the latter controls the synchronization of the different media.

The PSS includes media codecs for video, still images, vector graphics, text, audio, and speech.

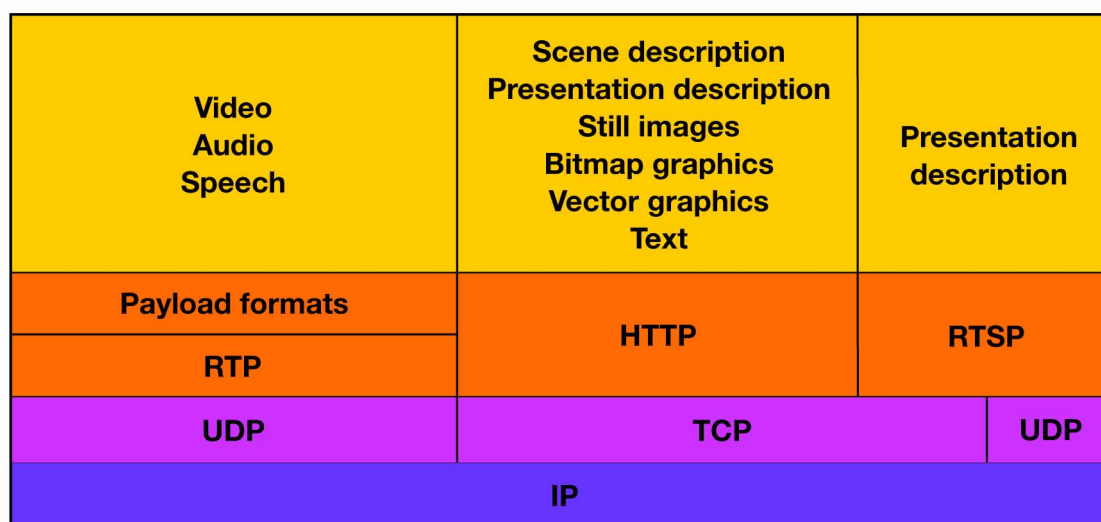| Video Audio Speech	Scene description Presentation description Still images Bitmap graphics Vector graphics Text	Presentation description	
Payload formats	HTTP	RTSP	
RTP			
UDP	TCP	UDP	
IP			

Figure 2. Overview of the protocol stack

Figure 2 describes the media transport protocol stack. Transport of media and control data consists of the encapsulation of the coded media and control data in a transport protocol. This is shown in figure 1 as the "packet based network interface" and displayed in more detail in the protocol stack of figure 2.

Entertainment

Media player

The Media player will play an important role in all coming Sony Ericsson products. The Media player supports different audio and video formats, streaming as well as download and playback.

Music

The Media player is a multi-format digital audio player which enables the user to carry and play a selection of favourite songs. A range of audio formats are supported:

- AMR
  Adaptive Multi Rate. A medium quality compressed sound format.

- MIDI
  Musical Instrument Digital Interface.
  Unlike the other formats, MIDI is not a recording of music, but a description which enables a local synthesizer to play the music from the instructions included in the MIDI file. Since a MIDI file only represents player information, it is far more concise than formats that store the sound directly. An advantage is very small file size. A disadvantage is the lack of specific sound control. MIDI is ideal for polyphonic ringtones.

- MP3
  MP3 is the file extension for MPEG audio layer 3. Layer 3 is one of three coding schemes (layer 1, layer 2 and layer 3) for the compression of audio signals. Layer 3 uses a very efficient compression method, removing all irrelevant parts of a sound signal that the human ear cannot perceive. The result is, for example, CD digital audio (CDDA) converted to MP3 with almost untouched quality, compressed by a factor of around 12. The high compression of audio in MP3 files makes them relatively small, though MP3 files can be created with different size/quality compromises. The small file size, together with the excellent sound quality, are the main reasons for the MP3-format's massive popularity when sharing music over the Internet.

Songs may be stored in the internal Z1010 user storage as well as on the Memory Stick Duo. The folder system enables the user to organize songs into groups and create simple playlists of MP3 songs. It also allows songs to be moved between internal and Memory Stick Duo storage.

Songs may be collected in numerous ways, including Internet download, file transfer from the PC and, of course, via the Memory Stick Duo.

The Media player is intelligently aware of other applications in the Z1010:

- Playback is paused when a telephone call is made or received

- Playback of MP3 files continues if the user switches to another application or closes the phone, providing music whilst using other applications such as the phonebook or calendar, or playing games.

Polyphonic ringtones

Background
The word "polyphony" means producing several notes at the same time. Almost all music that we listen to consists of polyphonic melodies. Up until now, most GSM mobile phones have not supported polyphonic sounds and ringtones.

Early Ericsson mobile phones supported a proprietary non-polyphonic format called eMelody. Due to the musical limitations of eMelody, and the popularity of creating, sending and downloading ring melodies, Ericsson and Sony Ericsson, together with other manufacturers, created the more advanced non-polyphonic sound format – iMelody.

The development of the iMelody format to the MIDI format has revolutionized sound quality. The MIDI files are small, and perfect for mobile devices, which have limited storage capacity.

MIDI – Musical Instrument Digital Interface – is a specification for a communications protocol principally used to control electronic musical instruments. MIDI is today a well known standard used by many musicians, composers, arrangers and so on.

A MIDI signal or file does not contain any music. It contains binary data (information) of how a melody is played and when this data reaches a synthesizer, the synthesizer will translate the binary data to music, when connected to an amplifier with speakers so that the sound becomes audible.

Please visit www.midi.org for more information.

SP-MIDI

SP-MIDI stands for Scalable Polyphony MIDI. SP-MIDI is based on the MIDI format and adapted for mobile phones and other portable products. The objective is to secure interoperability between products with different sound capabilities.

Initial recommendations for using SP-MIDI in 3GPP applications are discussed in a separate document, *Scalable Polyphony MIDI Device 5-24 Note Profile for 3GPP.*

Streaming media is a method of making audio, video clips and other multimedia available in real-time. Streaming media to computers has been used during the last couple of years, and now, with 3G, the technique gives the user a high-quality experience.

The term *streaming* refers to the technique it is based on. Previously you had to wait to download an entire file and then play it, whereas the use of streaming means the end user can almost immediately begin to watch or listen to the content of a requested file. The data in the file is broken down into small packets that are sent in a continuous flow, a stream, to the end user. It is then possible to begin viewing the file as the rest of the packets are transferred.

Video clips

The Media player supports download and playback of MPEG-4 and H.263 formats. This means that you can view the video clips you record with the VGA camera in the Z1010.

Video clips may be downloaded from the Internet or copied from a connected PC. Video files are large compared to still images.

Files must be of types MP4 or 3GP, having video encoded in MPEG-4 Simple Visual Profile and audio in AAC or AMR format. Video may also be encoded in H.263. The Z1010 will encode video in H.263 Profile 0 Level 10 format.

Streaming Support

The Media player can be launched from hyperlinks in the Browser or in messages. Content is streamed using RTSP (Real Time Streaming Protocol) session control according to 3GPP specification.

Streaming

Applications

The applications which can be built on top of the streaming services, can be classified into on demand, and live information delivery applications. Examples of the first category are music and video clips, news on demand as well as on demand instruction material. Live delivery of radio and television are examples of live information delivery.

The following video and music codec support is provided according to 3GPP:

- MPEG-4 Simple Visual Profile Level 0
- H.263 Profile 0 Level 10
- H.263 Profile 3 Level 10 (decode only)
- AAC
- AMR
- MP4
- 3GP

Examples of usage

Streaming of music (on demand)
Anna browses to a Web page and decides to check out the latest top ten list of pop music. She wants to know if there are any new cool songs. She picks out a few, streams the music to her mobile phone and listens to the songs through the stereo headset or via the built-in loudspeaker.

Streaming of news (on demand)
Bob browses to a morning paper's Web page and decides to check the news. He wants to see the five-minute version of the latest financial news. The news is streamed to his terminal, and he can watch it on the bus on his way to work.

Streaming/download of music video (on demand)
Mika browses to the a Web page and decides to check out the latest rock videos. He finds a video he wants to watch, so he clicks the link and then streams a one-minute version of the video. He then decides to download and pay for the complete video. A memory check is automatically performed to make sure that his mobile phone has enough free memory.

Streaming of live radio (broadcast)
Linda wants to check out and listen to the coolest radio station. She browses to the home page and starts to stream the content. The content is audio or audio with pictures of the artist.

Streaming of live traffic information (broadcast)
Nick wants to know if there is a traffic jam on the highway before he heads for home. He browses the page for local traffic information. There is a traffic jam, so he takes an alternative route home.

User-created content (Web album)
Sheila and Tom are on vacation. They want to show their friends how cool the beach is. They record a video clip and upload it to a Web album. Their friends can then stream or download the clip to their PC or mobile phone.

Market and revenue possibilities
As streaming means "seeing the product without having it", it can be extensively used in the music and film industry. There are also great revenue possibilities for subscription-based content: for example, the user can subscribe to several on demand services like news and traffic information.

Gaming

In these days, gaming is more or less seen as a standard feature in mobile phones. And the Z1010 promises to be a step ahead in this regard. And it does not only have to do with fast download through the UMTS network. Three other things make the actual gaming experience better – the way Java has been implemented, the fact that more processing power has been dedicated to the games and the large 65k colour screen. The result is games with improved graphics that react faster to your commands when using the navigation key as a game controller. The Z1010 takes mobile gaming to new levels.

Supporting J2ME (Java 2 Micro Edition), the Z1010 lets users download and run new games and applications. This is a great way to upgrade the game gallery, install work-supportive programs and personalize the phone.

SMIL

SMIL stands for Synchronized Multimedia Integration Language and is pronounced "smile".

The use of SMIL in a product allows the user to create and transmit PowerPoint-style presentations on the mobile device. SMIL is an advanced XML-based protocol, and Sony Ericsson's MMS implementation supports a subset of the SMIL 2.0 protocol. Using a media editor, users can incorporate text, audio, images, video clips and animations to assemble full multimedia presentations. The user

can decide in which order the image and text will be displayed, as well as for how long the images and text lines are to be shown on the screen.

Media types

There are certain media formats that support continuous media (speech, audio and video). The following media types are supported for SMIL:

- AMR narrow band speech codec MIME media type
- MPEG-4 AAC audio codec MIME media type

- MPEG-4 video codec MIME media type
- H.263 video codec MIME media type

The media types for JPEG and GIF can be used both in the 'content-type' field in HTTP and in the "type" attribute in SMIL 2.0. The following media types are to be used:

- JPEG MIME media type
- GIF MIME media type

All these media are pointed out by MIME (Multipurpose Internet Mail Extensions) types.

Imaging

Twin cameras – VGA camera and video call camera

VGA camera

With the integrated VGA camera, the user can take pictures and video clips and store them in the phone memory or on the Sony Memory Stick Duo. The user can send them as an attachment in an e-mail or a picture message.

Taking a picture

To activate the camera application, the user presses the dedicated camera button, or selects the camera function in the menu. A large viewfinder is presented to the user.

Image formats

The camera is able to send pictures in the following resolutions:

- QQVGA (160x120 pixels)
- QVGA (320x240 pixels)
- VGA (640x480 pixels)

Video format

Video clips can be played, recorded and sent using the following codec:

- H.263

Auto-exposure control

The camera has a fully automatic exposure control that selects the optimal exposure time needed to get an excellent picture. When operating the viewfinder, the camera adjusts the exposure time.

Lighting adjustment

The camera has built-in compensation for "bright skies" that automatically adjusts the brightness of landscape pictures. This avoids the dark and dull images that automatic cameras sometimes give in difficult lighting situations. It is especially effective for outdoor photography on grey and cloudy days. It is not possible to turn this feature off, but by including more or less sky in the picture, the user can get the compensation feature to turn on or off. This feature can also be used in a creative way to generate different effects in pictures.

Video call camera

With the video call camera, placed below the full graphic 65k colour screen, the user can participate in a video call. While the camera is capturing the user, he or she can watch the other participant on the screen.

The video call camera is a CIF camera. CIF cameras are perfect for pictures intended to be shown on a screen. The Z1010 CIF camera is exclusively used for video calling. During a video call, it is possible to switch between the video call camera and the VGA camera. This allows you to enjoy the benefits of both cameras during the call.

The speed of UMTS, the Z1010, and video call functionality, bring you as close as you can get when being apart. Like your own live TV broadcast, you can now share the latest news face-to-face with your friends back home.

Note: *Video calling using the Z1010 can only take place in UMTS networks and with other video-capable UMTS phones that support the 3GPP standard 3G-324M.*

Messaging

MMS

One of the key features in the Z1010 is MMS (Multimedia Messaging Service), expected to become the preferred messaging method of mobile terminal users, since there are virtually no limits to the content of an MMS transmission. An MMS message from the Z1010 can contain text, graphics, animations, images, audio clips and ring melodies. For third party developers' information, please visit www.SonyEricsson.com/developer/ and look for the MMS developers guidelines.

Defined and specified by 3GPP as a standard for third-generation implementation, MMS completes the potential of messaging. Sending digital postcards and PowerPoint-style presentations is expected to be among the most popular user applications of MMS. Eagerly awaited by young users in particular, MMS is projected to fuel the growth of related market segments by as much as 40%.

Using WAP (Wireless Application Protocol) as bearer technology and powered by the high-speed transmission technologies EDGE, GPRS and UMTS (WCDMA), Multimedia Messaging allows users to send and receive messages that look like Power-Point-style presentations. The messages may include any combination of text, graphics, photographic images, speech and music clips. MMS will serve as the default mode of messaging on all terminals, making total content exchange second nature. From utility to sheer fun, it offers benefits at every level and to every kind of user.

MMS objects

Although MMS is a direct descendant of SMS, the difference in content is dramatic. The size of an average SMS message is about 140 bytes, while the maximum size of an MMS message is limited only by the memory capabilities of the mobile phone. That is why the key word to describe MMS content is rich. Complete with words, sounds and images, MMS content is endowed with the user's ideas, feelings and personality. An MMS message can contain one or more of the following:

Text
As with SMS and EMS (Enhanced Messaging Service), an MMS message can consist of normal text. The length of the text is unlimited. The main difference between an EMS and MMS message is that in an MMS message, text can be accompanied not only by simple pixel images or melodies but by photographic images, graphics, audio clips and video clips.

Templates
The Z1010 comes with a number of MMS pre-defined templates, for example templates for birthday cards, meeting requests etc.

Audio
MMS provides the ability to send and receive full sound (iMelody, AMR) messages. Not only can users share a favourite song or ringtone with a

friend, they can also use the mobile phone to record a sound and send it along with a message. Because sound includes speech as well as music, this extra dimension of an MMS message makes for enhanced immediacy of expression and communication. Rather than sending a downloaded birthday jingle in EMS, a user can, for example, send a clip of his or her own personal rendition of "Happy Birthday". In the Z1010, the MIDI-format is supported.

Pictures and themes

By using the integrated camera, users can take a picture and immediately send it to a recipient. The ability to send pictures is one of the most exciting attributes of MMS, as it allows users to share meaningful moments with friends, family and colleagues.

Mobile picture transmission also offers inestimable utility in business applications, from sending on-site pictures of a construction project to capturing and storing an interesting design concept for later review. Editing a picture by adding text allows users to create their own electronic postcards, an application that is expected to substantially cut into the traditional postcard market.

Themes (downloaded or pre-defined) can be exchanged via MMS.

PIM communication with MMS

By using MMS, it is easy to handle PIM (Personal Information Manager) information. The user can send and receive business cards, calendar entries and notes.

Business card (vCard)

By using MMS, the user can send his/her business card.

Calendar entry (vCal)

By using MMS, the user can send an appointment.

Notes (vNotes)

The Z1010 supports vNote, so notes can be sent via MMS.

Streaming content in MMS

The MPEG-4 file format can be used for continuous media along the entire delivery chain envisaged by the MMS, independent of whether the final delivery is done by streaming or download, thus enhancing interoperability.

In particular, the following stages are considered:

- Upload from the originating terminal to the MMS proxy.
- File exchange between MMS servers.
- Transfer of the media content to the receiving terminal, either by file download or by streaming. In the first case, the self-contained file is transferred, whereas in the second case the content is extracted from the file and streamed according to open payload formats. In this case, no trace of the file format remains in the content that is transmitted over the wire/over the air.

Additionally, the MPEG-4 file format can be used for storage in servers and the "hint track" mechanism can be used to prepare for streaming.

Benefits with MMS

By allowing the mobile terminal to serve as an image processor and conveyor, Multimedia Messaging accommodates the exchange of important visual information as readily as it facilitates fun. Business and leisure usage of MMS will be dynamically merged, resulting in enhanced personal efficiency for users and increased network activity for operators. In short, MMS affords total usage for total communication

Because MMS uses WAP as its bearer technology and is being standardized by 3GPP, it has wide industry support and offers full interoperability, which is a major benefit to service providers and end users. Ease-of-use resulting from both the gradual steps of the messaging evolution and the continuity of user experience gained from interoperability is assured.

The MMS server, through which MMS messages are sent, supports flexible addressing (to both normal phone numbers (MSISDN) and e-mail accounts), which makes the user interface more friendly and allows greater control for operators. The MMS server, moreover, is responsible for the instant delivery feature of MMS.

MMS technical features

The MMS standard, just like that of SMS, offers store-and-forward transmission (instant delivery) of messages, rather than a mailbox-type model. MMS is a person-to-person communications solution, meaning that the user gets the message directly into the mobile phone. He or she does not have to

call the server to get the message downloaded to the mobile. Unlike SMS, the MMS standard uses WAP as its bearer protocol. MMS will take advantage of the high speed data transport technologies EDGE and GPRS and support a variety of image, video and audio formats to facilitate a complete communications experience.

the MMS network architecture, providing storage and operational support, enabling instant delivery of multimedia messages from terminal-to-terminal and terminal-to-e-mail, and supporting flexible addressing. The centre's MMS Proxy-Relay interacts with the application being run on the MMS-enabled terminal to provide various messaging services. WAP is used as the bearer of an MMS message between the MMS-C and the MMS client (application). The WAP Gateway is used for delivery and retrieval of messages.

Architecture

The MMS Centre (MMS-C) is comprised of the MMS Server, the MMS Proxy-Relay and the MMS Store. The MMS Centre is the central element of
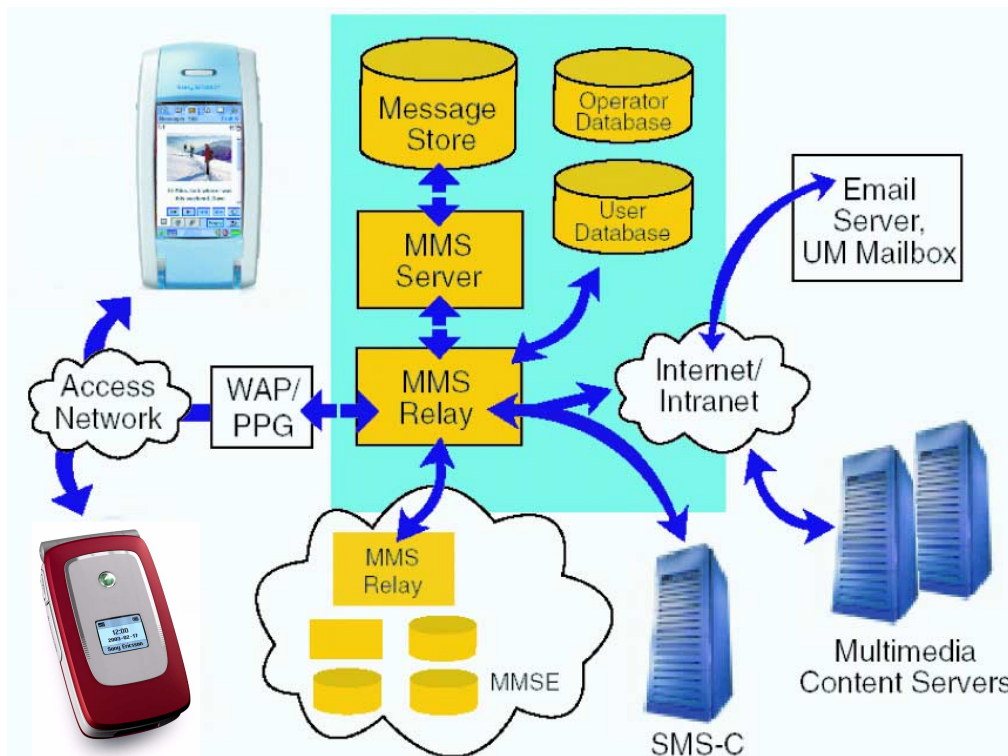
Figure 3. The architecture of MMS

Message conversion

The MMS-C is able to perform limited message conversion - for example, from MMS to SMS - so that processing and air time is not wasted in sending messages to mobile terminals that do not have adequate capability to receive them. It also handles service aspects such as store and forward, guaran-

teed delivery, subscriber preferences, operator constraints, and billing information. The MMS-C also vouches for high quality messaging, for example by format conversion. This means that the MMS-C recognizes which formats are supported in the mobile phone, and adapts the MMS messages to these formats.

OTA configuration
Users can easily get MMS into their phone. MMS supports OTA, meaning that the user does not have to configure the settings manually. The configuration is done by the operator.

Connectivity

Memory Stick® Duo®

Memory Stick® provides a convenient way of adding storage and other functions to a wide range of devices. The Z1010 supports Memory Stick Duo, a miniature version of the Memory Stick series which is just one third the volume of standard Memory Sticks. Memory Stick Duo starts at 8 MB and has a roadmap which foresees sizes up to 128 MB. A 16 MB Memory Stick Duo is supplied with the Z1010.

Via a Memory Stick Duo Adaptor, Memory Stick Duo can be plugged into any standard size Memory Stick slot. The two types have full electrical and file system compatibility.

Physical and Electrical Properties
The Memory Stick Duo is very space-efficient. It is 20 mm wide, 1.6 mm high and 31 mm deep, with a volume of 992 mm^3. The Memory Stick Duo weighs 2 grams. The electrical contact consists of 10 pins in a structure which prevents direct touch, providing high reliability.

A serial protocol is defined for Memory Stick. This is optimized for the larger capacity memories that will be available in the future. Current maximum transfer speed is 2.45 MBps to read data and 1.8 MBps when writing data.

Wide Industry Support
Memory Stick is supported by a wide range of companies including major names in consumer electronics, computing, automotive, mobile phone, photographic and semiconductor sectors of industry. As of July 30th, 2003, 471 companies have declared support at www.memorystick.org.

Memory Stick compliant products include PCs, PDAs, digital cameras, portable music players, printers, projectors and entertainment robots. Future applications include home and car audio, game machines and multimedia kiosks.

Memory Sticks are currently marketed by Sony, SanDisk, Lexar Media, I-O Data Device Inc. and Apacer Technology. As of March 2002, there were already over 20 million users of Memory Stick worldwide. (Source: www.memorystick.com).

PC and Apple Mac Support
PCs and Apple Macs may be enabled for Memory Stick via built-in Memory Stick slots, Floppy Disk adaptors, PC Card adaptors, USB adaptors and even a Memory Stick enabled mouse (Memory Stick Duo Adaptor required).

Memory Stick Duo Use Cases in Z1010
Any number of Memory Stick Duo units can be used with this phone, providing virtually unlimited storage opportunities.

Here are the main use cases:

- Additional storage for pictures taken with the integrated VGA camera.
- Images from the integrated VGA camera can be transferred to other image-aware devices such as PCs and printers.
- Transfer of data and media (sounds, pictures, video clips, documents etc) between the Z1010 and a PC or Mac.

- Save data and media from the Z1010 on to the Memory Stick Duo, for example to make backup copies of important files.
- Transfer of data and media between phones which support the Memory Stick Duo.
- Third party applications can make use of Memory Stick Duo storage.
- Data can be transferred between a Memory Stick Duo in the Z1010 and a connected PC.
- Personalize the Z1010 using media on the Memory Stick Duo, for example pictures and sounds.
- Use media on the Memory Stick Duo when composing MMS.

Specifically, the following built-in applications are enabled to work with the Memory Stick Duo: Integrated VGA camera, Pictures, Media player, E-mail (attachments), MMS (media), Browser, Telephony (ringtones).

Compatibility with other Memory Stick devices

The Z1010 follows the file system layout that is recomended by the Memory Stick organisation for pictures and sounds. This ensures interoperability with all devices following the same standard.

For devices that do not follow the same standard as Memory Stick Duo, interoperability is possible by accessing the same folder structure. For a PC or Mac, this is easily done by browsing to the required folder on the Memory Stick Duo. Memory Stick enabled devices that lack browsing capability may be unable to share data with the Z1010.

Bluetooth™ wireless technology in Z1010

The Z1010 features built-in Bluetooth wireless technology. Its Bluetooth power class 1, 20 dBm radio link, operates in the globally available 2.4 GHz radio frequency band, ensuring fast and secure communications up to a range of 100 metres, or even much more in ideal conditions and between two class 1 devices. Please note that in the rather few countries where the use of Bluetooth wireless technology is not allowed, the Bluetooth function will be disabled. In countries where only lower output than 4 dBm or 0 dBm is allowed, the output is limited as a customized factory setting.

Bluetooth wireless technology is designed to be fully functional, providing high transmission speeds, even in noisy radio frequency environments. All data transfer is protected by advanced error-correction methods, ensuring a high level of data security.

Bluetooth wireless technology facilitates instant connections, which are maintained even when the devices are not within line of sight. Enhanced audio quality voice transmission is provided under adverse conditions, making it possible to use a headset connection to the Z1010 at all times.

Ericsson, one of the parent companies of Sony Ericsson, is a founding partner of the Bluetooth Special Interest Group (SIG). Bluetooth wireless technology devices include:

- Headsets for wireless voice transmission and remote call control
- Wireless car handsfree kits
- PCs, laptops, PDAs, palmpads for data transfer, synchronization etc.
- PC cards for Bluetooth wireless technology in laptops and PDAs
- Other phones for exchanging business cards, ringtones, playing games etc.
- Digital still and motion video cameras
- Printers, hard disks and other storage devices
- Handheld scanners for text, barcodes and images
- Household appliances with built-in logic, as well as games and entertainment devices

Using Bluetooth wireless technology in the Z1010

True wireless connection
Cable replacement for connecting to headsets, car handsfree equipments, computers/PDAs, digital still and motion video cameras and other devices.

April 2004

Up to 16 added devices
The Z1010 identifies and maintains up to 16 devices which are displayed in a list in the phone.

Radio link
No line of sight required; the phone can remain in a briefcase or in a pocket (whereas infrared requires line of sight).

Secure and fast
Data connection with a Bluetooth PC/laptop or PDA turns the phone into a modem for connecting to the Internet and for data transfer (faster than infrared or cable).

Synchronization
Fast synchronization, even without line of sight, of calendar, notes and phone book with PC/laptop.

Business cards
Quick exchange of business cards, notes and calendar events with other phones and devices.

Imaging/music
Exchange still images and video clips with another mobile phone, a PC/laptop, and with a digital still and motion video camera. Use the Z1010 as a modem to send pictures from a digital still and motion video camera to an imaging server.

Exchange music files with another mobile phone and a PC/laptop.

Audio quality
Z1010 uses a clever algorithm that repairs lost packets of up to 25 % on the uplink side. It not only inserts a new packet, it also simulates the audio content of those packets. This, in conjuction with the high sensitive and high output power radio will enhance the audio quality compared to a standard Bluetooth device.

Profiles
The following Bluetooth profiles are supported in the Z1010:

- Dial-up Networking Profile
- Generic Access Profile
- Generic Object Exchange Profile
- Object Push Profile
- Serial Port Profile
- Handsfree Profile
- Headset Profile
- Synchronization Profile
- Basic Imaging Profile
- File Transfer Profile

IrDA

IrDA (Infrared Data Association) is a point-to-point communication link between two infrared ports. The infrared beam has to be directed towards the target infrared port and as long as the two infrared ports are within sight and range, the devices exchange data. For optimal performance, place the Z1010 within 30 centimetres and at an angle of 30 degrees to the infrared port on the PC/PDA, or other phone. An advantage of the necessary proximity of devices is reduced risk of transmitting data to other nearby devices.

An infrared link is a serial connection, which means that data bits are sent one after another in a long stream. The IrDA–SIR Data Link Standard is a protocol that makes transmission of data faultless. The standard provides a high level of noise immunity, which means that the connection is not affected by fluorescent light, sunlight and electromagnetic fields – making it suitable for the modern office environment.

Key benefits of using the Z1010 with its built-in infrared transceiver:

- True wireless communication
- Low power consumption
- Secure data transmission with the IrDA DATA standard
- Ability to send and receive e-mail and data on the connected PC/PDA
- Ability to connect to the Internet from the connected PC/PDA
- Ability to synchronize the phone book from a PC
- Exchange of business cards and calendar events with vCard/vCalendar compatible devices

- Exchange of ringtones between compatible phones
- Ability to attach a photo from a digital camera in outgoing e-mail
- Ability to send and exchange notes with vNote compability devices

Connection via cable

The infrared connection is not always the best solution when connecting to a PC/PDA. Indeed, it is not always even possible. The DRS-11 cable provides the same connectivity between the phone and another unit.

The DRS-11 cable supports a subset of the signals in the RS-232 standard.

USB

USB 1.1 (Universal Serial Bus) was announced (by Compaq, Digital, IBM, Intel, Microsoft, NEC and Northern Telecom) in 1995 as "an open and freely licensed" serial bus.

The bus is 12 Mbps and supports 63 devices. The idea of the USB is to allow easy connection of mobile phone to PC. USB is designed to be "completely Plug and Play", meaning that devices will be correctly detected and configured automatically as soon as they are attached.

USB in a mobile phone means convenient data transfer between the phone and a PC. For example, in this phone, which has an integrated camera, pictures can be transferred from the phone to be stored in the PC. Music or short video clips can also be transferred from the PC to the phone, or vice versa.

Synchronization & Data Transfer

In everyday life, access to an updated calendar, notes and details of friends and business colleagues is greatly appreciated. To be truly mobile, users must be able to carry their important information with them. Equipping mobile phones with Personal Information Manager (PIM) programs like calendars, task lists and address books gives users access to their most important data anywhere and anytime. The information is kept updated by synchronizing with the information at the office or at home. The growing use of groupware such as Microsoft® Outlook® means that more and more meetings are booked electronically in daily business life.

The Z1010 uses the SyncML 1.1.1 protocol for synchronization. This means that it has compatibility to synchronize with a wide variety of devices over a number of different communications media.

SyncML – An Open Standard for Synchronization

SyncML Background

Leading the way in providing remote synchronization capability, Sony Ericsson realizes that interoperability of remote synchronization is of utmost importance if mobile data usage is to become as widespread as generally predicted. That is why Ericsson, along with IBM, Lotus, Motorola, Matsushita, Nokia, Palm Inc., Psion and Starfish Software,

founded the SyncML initiative in February 2000. Supported by more than 600 software and hardware developers, the SyncML initiative seeks to develop and promote a globally open standard for remote synchronization, called SyncML. Unlike many other synchronization platforms, SyncML is an open industry specification that offers universal interoperability. Because it uses a common language, called XML, for specifying the messages that synchronize devices and applications, SyncML has been called the only truly future-proof platform for enabling reliable and immediate update of data. The benefit for the end user is that SyncML can be used almost anywhere and in a wide variety of devices, regardless of application or operating system.

What is SyncML?

SyncML is the common language for synchronizing all devices and applications over any network. SyncML leverages Extensible Markup Language (XML), making SyncML a truly future-proof platform. With SyncML any personal information, such as E-Mail, calendars, task lists, contact information and other relevant data, will be consistent, accessible and up to date, no matter where the information is stored. For example, a calendar entry made to a mobile device on a business trip is equally available to a secretary in a network calendar. SyncML is the ultimate choice for remote synchronization.

The Z1010 uses SyncML for both local synchronization (for example, with a PC using Bluetooth or a cable connection) and remote synchronization over WAP and HTTP.

Designed for the wireless world

SyncML is designed specifically with the wireless world's tight requirements in mind. SyncML minimizes the use of bandwidth and can deal with the special challenges of wireless synchronization, such as relatively low connection reliability and high network latency. SyncML supports synchronization over WAP, HTTP or OBEX. As an open, future-proof standard, SyncML is the synchronization choice for any device or application of the mobile information society.

Benefits of a common synchronization protocol

End users

Today's user of mobile devices probably uses a different synchronization product with every device. Each technology can synchronize only a few applications, or is limited to a particular type of network connection. This arrangement is expensive to install, confusing to configure and operate, and costly to administer. With SyncML, users will be able to buy devices that synchronize with a broader range of data.

Device manufacturers

Device manufacturers will benefit from a common protocol that will make the device interoperable with a broader range of applications, services, and network and transmission technologies.

Service providers

Service providers moving into the growth arena of application hosting are particularly concerned that a proliferation of synchronization technologies will make it impossible to deploy and support their customers in a cost-effective manner. To support the range of data types and devices in use today, service providers must install and configure multiple server infrastructures, maintain and support that infrastructure, and maintain compatibility and performance. The alternative now available, to use a single solution for data connectivity, involves the risk of a tight coupling to a propriety solution. With SyncML, they will be able to provide connectivity to a wider selection of applications.

Application developers

Choosing to support multiple synchronization technologies enables an application to support more types of devices and networked data, but that choice comes at a cost. With SyncML, application developers will be able to develop an application that can connect to a more diverse set of devices and network data.

Network operators

As multiple applications that need remote synchronization over WAP are developed, there will be an automatic growth of revenue for network operators.

Which information can be synchronized in the Z1010

Remote Synchronization

Application	Remote sync	Local sync
Contacts	Yes	Yes
Calendar	Yes	Yes
Tasks	Yes	Yes
Notes	Yes	Yes

Remote synchronization takes place over the air using HTTP and is the ideal way to keep the Z1010 up to date. Using GPRS, the Z1010 can be continuously connected to the remote synchronization server.
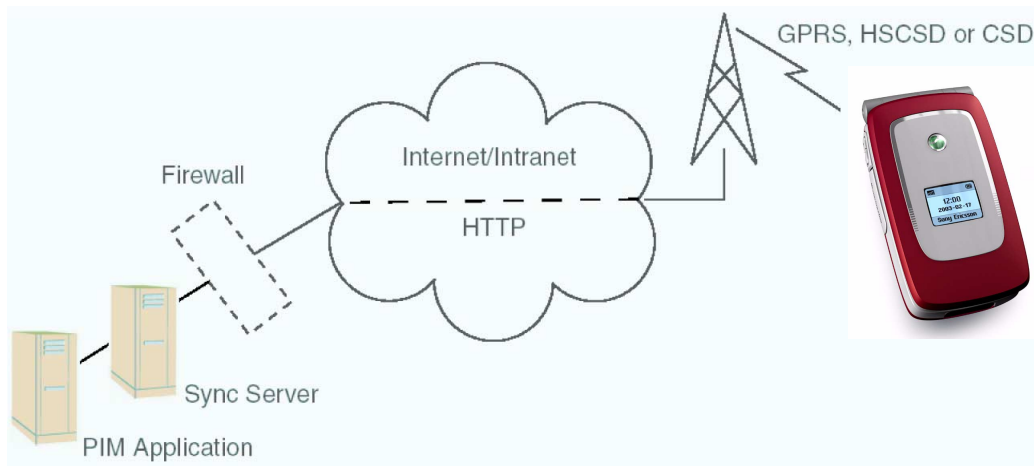
Synchronization services will be offered by third-party service providers and as added capability to corporate PIM applications. Corporate PIM applications such as Microsoft® Exchange can be supplemented with SyncML capability.

Local Synchronization

The Z1010 is supplied with PC software for local synchronization. It may be loaded from the CD-ROM.

Bluetooth, infrared or cable

The Z1010 always synchronizes using SyncML, regardless of connection type. It connects via Bluetooth wireless technology, infrared or cable. The cable is connected either directly to the phone or to the desktop charger.

Intelligent process

A synchronization engine performs the task of synchronizing. For local synchronization, the synchronization engine is an application that runs on the desktop computer. The synchro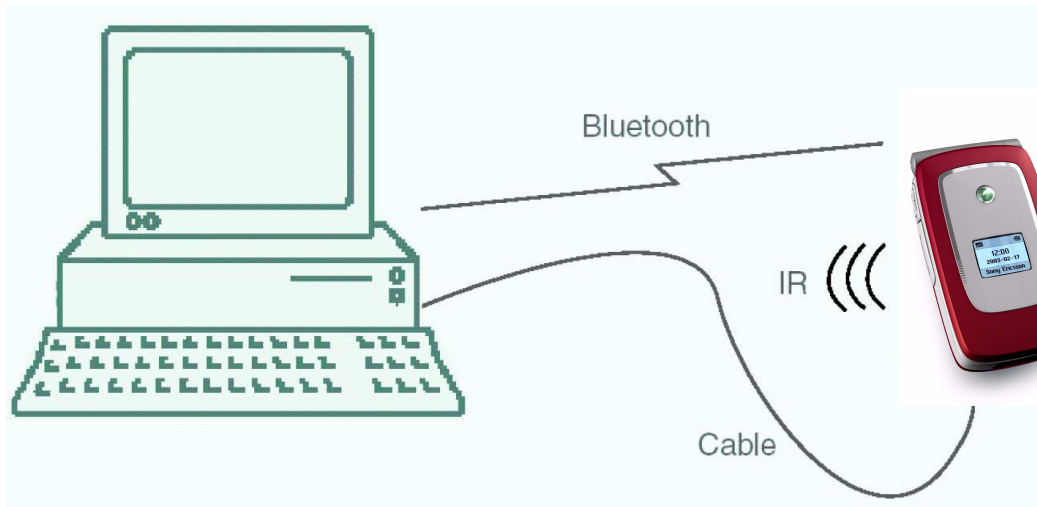nization engine compares, updates and resolves conflicts to ensure that the information in the phone is the same as that in the computer.

Compatibility

The supplied PC software enables synchronization with the following applications:

- Microsoft® Outlook® 98, 2000, 2002

The PC requirements are as follows:

- Microsoft® Windows® 2000, Me, XP
- Minimum recommended hardware configuration for the version of Windows in use.
- 30Mb free space on hard disk

File Transfer Utility

A utility is provided which enables files to be transferred to and from a Z1010 connected to a PC. Typical uses for this include:

- Archiving pictures taken on the Z1010 to PC storage
- Moving images to the Z1010 to use in personalization, MMS messages etc.
- Moving sound clips to/from the Z1010 for personalisation.

DRM

Digital Rights Management, DRM, is a technology that enables secure distribution, promotion, and sale of digital media. Examples of such content include personal images, wallpapers and screen savers with themes from films, ringtones from musical artists, and branded games. In other words, content providers can control how users may use different types of content in devices, such as mobile phones, smart phones or PDAs. Content providers can also control the use of content in related services, such as MMS.

Sony Ericsson is actively focusing on technology standardization for the DRM concept, and supports the ongoing standardization work/activities of the OMA (Open Mobile Alliance). Sony Ericsson is fully committed to open standard solutions in the mobile environment and is a principal driver of many open standard initiatives. This will ensure the interoperability of mobile terminals in the DRM area and also result in a strong, competitive DRM standard.

How DRM works

The control of the content in digital media is executed by defining usage rights for the content. The usage rights give the content providers flexibility in the way they can publish and sell content. Rights can be defined so that a picture can be used by subscribers only, and rights can be defined so that a ringtone can be played only a limited number of times or for a limited period of time. Rights can also be defined so that the user is not able to forward content to other devices.

Packaging of rights and content

Rights and content can be packaged together and delivered to the device as one DRM package. As an alternative, content can be delivered to the device first, followed by the rights later being pushed to the device, for example via SMS. The kind of service and business model adopted by the content provider determines how the content and rights should be packaged and delivered to the device.

DRM packager

A DRM packager is typically included in the software used by the content provider. It is used to create the DRM package that is delivered to the device, including content and associated rights. In the device, the content of the DRM package is made available to the user according to the rights. If the rights permit the user to play a ringtone ten times, the device will keep track of the number of times the ringtone is played, and notify the user when the ringtone has been used for the tenth time.

Protection properties

Content protection according to the OMA DRM standard gets special properties. Content with forward lock protection has the "Send to" option disabled, which prevents it from further distribution.

Unless the content is encrypted, the user cannot copy DRM content to other devices since the "Send to" option is disabled for pictures, ringtones, etc. that are OMA DRM protected. Content providers may choose to protect some content, but leave some content unprotected.

Package and delivery

The OMA DRM standard defines two ways to package and deliver rights and content to a device: combined or separated.

Combined delivery

Rights and content are packaged together into one DRM Package and delivered to the device. In the simplest case, no special rights are defined. The content is just put into a DRM package, thus protected from being copied out from the device by the user. This special case is called "forward-lock". It is useful for all types of content that the provider wants to charge for.

Separate delivery

Rights are defined and put into a file of their own. The content is encrypted and made available for users to download to their devices. The decryption key is put into the rights file. Since the content is encrypted, users cannot access it before the rights have also arrived to the device. In this case, the content can be freely distributed on the network, only users with the rights file can access the content. Content providers can deliver the rights to the user using push technology.

Downloading servers and publishing servers

When using a mobile phone, the users do not have to be aware of the network architecture. During a content downloading session, typically many physical servers are involved. Sometimes transactions may take place between different companies' servers.

The actual content may be put on one server, the downloading server. The content can be reached, for example, through references from one or many other servers, the publishing servers. The content creator puts his or her content on the downloading server through an interface to the content provider.

The user navigates to the publishing server and selects the content, or rather a link to or description of the content. The content is then downloaded from the actual downloading server.

When content is downloaded to the device, operators generate revenues from the user via, for example, their billing system. Operators might in their turn be billed for rights by the content aggregator, content provider or directly by the content creator.
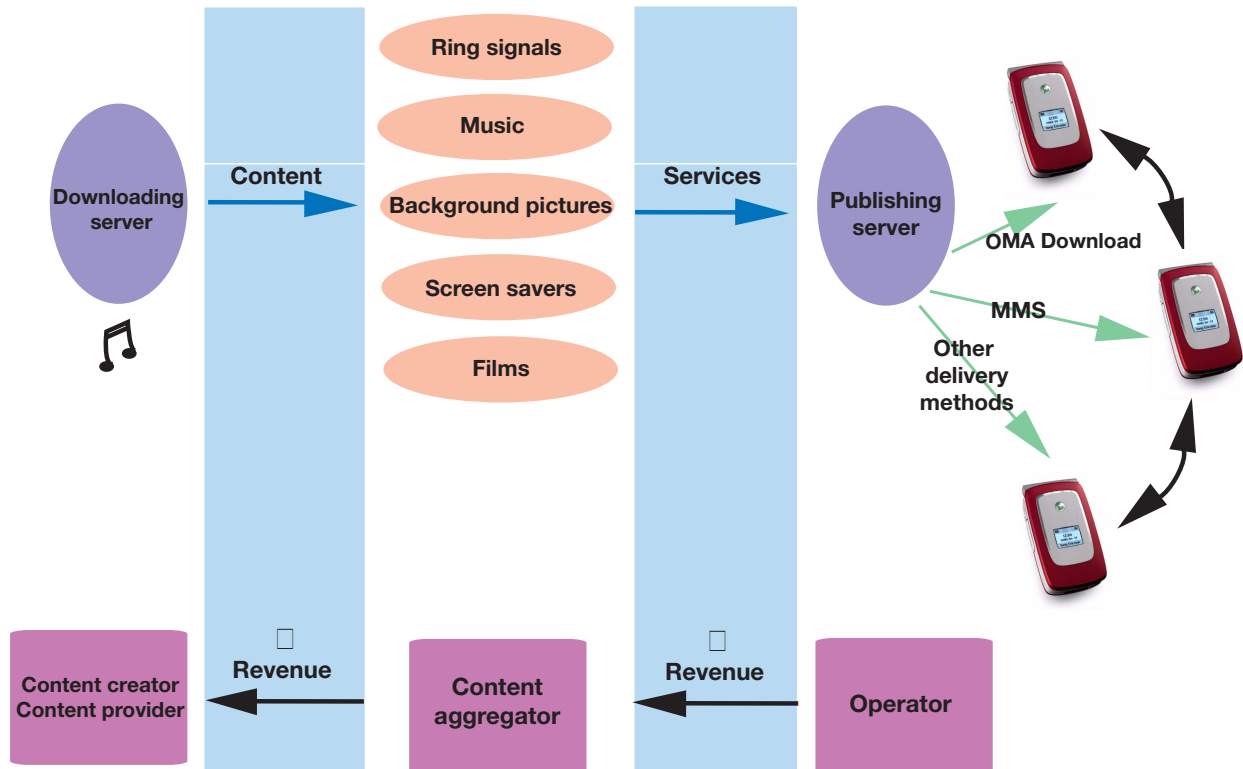

Figure 4. The flow of revenues and content. The content is viewed and selected from a publishing server and downloaded to the mobile phone from a downloading server. The revenue is in this case collected from the user by the operator and transferred to the content creator via the content aggregator.

Object Exchange – 'Send As'

The Z1010 makes it possible to transfer objects via Bluetooth, infrared and messaging. This is presented to the user via 'Send as' commands in applications. Simply select an item such as a contact, select 'Send as' and select the method to be used for sending. Typical applications are to beam an appointment to other people, or to receive a new background image.

Bearer > Application	IR	Bluetooth	SMS	EMS	MMS	E-mail
Contact	Yes	Yes	Yes	Yes	Yes	No
Appointment	Yes	Yes	No	Yes	Yes	No
Tasks	Yes	Yes	No	Yes	Yes	No
Notes	Yes	Yes	No	Yes	Yes	No
Image	Yes	Yes		Yes	Yes	Yes
Sound	Yes	Yes		Yes*	Yes	Yes
Bookmark	Yes	Yes	Yes	Yes	Yes	Yes
Voice memo	Yes	Yes			Yes	Yes
Third party applications	Yes	Yes	Yes	Yes	Yes	Yes

* Only an iMelody can be sent in an EMS.
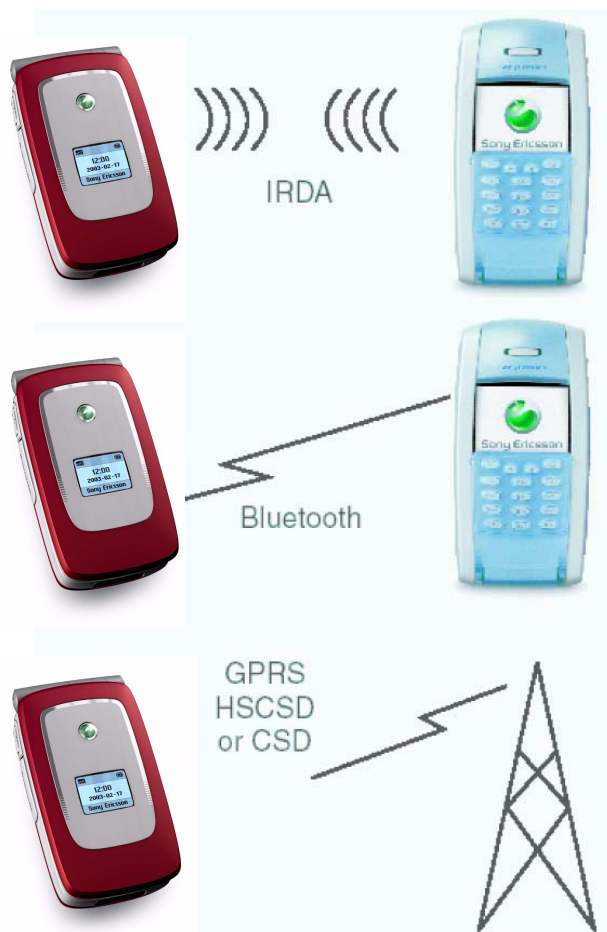
To perform a 'Send as' beam operation using infrared, the two devices are lined up and the sender initiates the transfer.

To beam over Bluetooth, a scan finds the other activated (discoverable) devices within range. The user can then select the required device and send the information across.

When sending via SMS, MMS or E-Mail, the required message type is created with the selected object attached. It is then sent over the air.

April 2004

Java 2 Micro Edition

Originally developed by Sun in 1991, Java is a programming language used to develop applications - utility programs, games, plug-ins etc. - for different hardware and software platforms. Users of Java-enabled devices can install new applications and games to make their devices more personal and adapt them to specific needs.

J2ME CLDC/MIDP (kJava)

In 1999, Sun regrouped its Java technologies into three platforms or editions. J2ME (Java 2 Micro Edition) became the platform targeting "micro" devices with small processors and memory capacities, such as mobile phones, communicators and PDAs. (The other two Java platforms are Java 2 Standard Edition, J2SE, and Java 2 Enterprise Edition, J2EE).

J2ME addresses a variety of devices. To handle the diversity, two concepts have been introduced – configurations and profiles. A configuration defines a minimum platform for a family of devices with similar processing and memory capacities. A profile targets a specific device category within that family, for instance mobile phones.

Two J2ME **configurations** are available:

- **CDC**, Connected Device Configuration. This configuration is aimed at devices such as PDAs.
- **CLDC**, Connected Limited Device Configuration. This configuration is aimed at devices such as mobile phones and pagers.
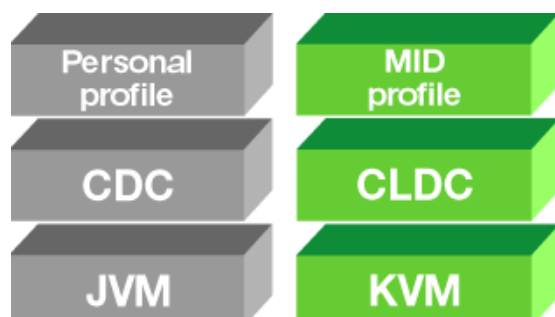

Figure 5. J2ME in detail

Current situation

So far, two **profiles** have been established for J2ME:

- **MIDP**, Mobile Information Device Profile, and
- **Personal Profile**.

MIDP is connected to the CLDC configuration and provides developers with essential information and guidance when writing programs for mobile phones and two-way pagers.

Personal Profile is linked to the CDC configuration. Targeted at PDAs, this combination replaces PersonalJava in J2ME.

CLDC/MIDP v. PersonalJava

Besides targeting different types of devices, the main difference between J2ME CLDC and PersonalJava from a user's point of view is that applications written in J2ME CLDC can be downloaded from the Internet. PersonalJava applications are typically transferred to devices from a PC via cable.

Hand-held computers and mobile phones that support Java also need a Java interpreter to run the applications. Since the Java Virtual Machine (JVM) was not the optimal interpreter for devices with small memory capacity and slower processors, Sun developed K Virtual Machine (KVM). A KVM requires only 40-80 KB of memory and can run on processors with low clock frequency. KVM is only used for J2ME CLDC. PersonalJava relies on the Java Virtual Machine (JVM).

PersonalJava has a richer application environment and can interact more extensively with the phone software.

J2ME CLDC uses a security model, often referred to as the sandbox. The sandbox includes a number of system components working together to ensure that untrusted applications cannot gain access to system resources. To put a sandbox into service, the Java platform uses three major components: the class loader, the byte-code verifier and the security manager. Each part plays an important role in maintaining the integrity of the system by securing that:

- Only the correct classes are loaded.
- The classes are in the correct format.
- Untrusted classes do not execute dangerous instructions.

- Untrusted classes are not allowed access to protected system resources.

Java2ME in Z1010

The Z1010 supports Java 2 Micro Edition (kJava). The functionality consists of:

- JSR 139 CLDC 1.1
- JSR 118 MIDP 2.0
- JSR 185 JTWI 1.0
- JSR 120 Wireless Msg API (the SMS part, not cell broadcast).
- The following functions of the JSR 135 Mobile Media API:
  - Audio playback
  - Video playback
  - Camera snapshot

Facts and figures

Technical specifications

General technical data

Product name	Z1010
System	Dual mode, dual band GSM phase 2 recommendations. GSM 900 (CTR 19 and CTR 20), GSM 1800 (CTR 31 and CTR 32), EGSM and WCDMA FDD mode supported
Speech coding	HR, FR, EFR, AMR supported where available, for high speech quality
GSM SIM/ UMTS USIM card	GSM SIM - GSM 11.11, UMTS USIM - 3GPP TS 31.102. Small plug-in card, 1,8 V and 3 V

Exterior description

Graphic screen	Type: Full graphical Resolution: 176 x 220 pixels Technology: TFT Colours displayed together: 65,536 Backlight colour: White
Second display	Type: FSTN Resolution: 101 x 80 Greyscale: 4-level Backlight colour: Blue
Antenna	Built-in
Colours	Power Red Precious Silver
Battery	1200 mAh, Lithium Polymer
Network LED	No
Keypad	4-directional + one select navigation key

Performance and technical characteristics

Dimension	GSM 900/E-GSM 900	GSM 1800	WCDMA
Frequency range	TX: 880 – 914 MHz RX: 925 – 959 MHz	TX: 1710 – 1785 RX: 1805 – 1880	TX:1920 –1980 MHz RX:2110 – 2170 MHz
Channel spacing	200 kHz	200 kHz	5 MHz
Number of channels	174 Carriers *8 (TDMA)	374 Carriers *8 (TDMA)	N/A
Modulation	GMSK	GMSK	QPSK
TX Phase Accuracy	< 5° RMS Phase error (burst)	< 5° RMS Phase error (burst)	Error Vector Magnitude: <17.5%
Duplex spacing	45 MHz	95 MHz	190 MHz
Frequency stability	+/- 0.1	+/- 0.1	
Voltage operation (nominal)	3.6 V	3.6 V	3.6 V
Transmitter RF power output	33 dBm Class 4 (2 W peak)	30 dBm Class 1 (1 W peak)	24dBm Class 3 (0.25 W peak)
Transmitter Output impedance	50 Ω	50 Ω	50 Ω
Transmitter Spurious emission	< -36 dBm up to 1 GHz < -30 dBm over 1 GHz (according to GSM spec.)	< - 30 dBm (according to GSM spec.)	< -36 dBm up to 1 GHz < -30 dBm over 1 GHz (according to 3GPP spec.)
Receiver RF level	Better than – 102 dBm	– 102 dBm	Better than -117 dBm @ 12.2 kbps CS voice
Receiver RX Bit error rate	< 2.4%	< 2.4%	< 0.1%

Battery and charging time

Dimension	Value in GSM 900
Standard battery (LiPolymer) 1200 mAh	Charging time: At least 90% charged within 2 hours

April 2004

Twin cameras – VGA camera and video call camera

Facts and figures	
Picture sizes (resolution) VGA camera	QQVGA (160 x 120 pixels) QVGA (320 x 240 pixels) VGA (640 x 480 pixels) QCIF (176 x 144 pixels - applicable only for video recording and telephony, not for still images)
Video Call camera	QCIF (176 x 144 pixels)
Colour depth	24 bit (8 bit per RGB channel), 16.78 million colours
Camera memory	Using phone memory or Memory Stick

Media player

File Format	Video: MP4 (MPEG4 and AAC), 3GP (H.263 AMR and AAC) Audio: AMR, MP3, G-MIDI level 1 with 72 voices polyphony, WAV (up to 16 KHz sample-rate)
Streaming transport	RTSP according to 3GPP
Video decoding	MPEG-4 Simple Visual Profile Level 0 H.263 Profile 0 Level 10 H.263 Profile 3 Level 10
Audio decoding	AAC, AMR, MPEG layer 3
Features	Automatic loop of songs in folder Automatic pause on telephone call.

Pictures

Formats	JPEG, BMP, GIF (including animated), PNG, WBMP
Sharing via	IR, Bluetooth, MMS, E-mail, PC file transfer, Memory Stick Duo, USB

Image decoders

Decoder	Details	Size	Colour depth	File format
GIF	87a/89a			

JPEG	ISO/IEC JPEG • Baseline DCT • Progressive DCT • Non-differential • Huffman coding • Symbol 'SOF2'	VGA		• JFIF v1.02 • EXIF
BMP	The bitmap image format used by Windows®.	XRAM dependent, default is VGA	24 bit	
WBMP				
PNG				

Image encoders

Decoder	Details	Size	Colour depth	File format
GIF	89a			
JPEG	ISO/IEC JPEG • Baseline DCT • Non-differential • Huffman coding • Symbol 'SOF0'	VGA		JFIF v1.02
BMP	The bitmap image format used by Windows®.	XRAM dependent, default is VGA	24 bit	
WBMP				

Short message service

Feature	Support in the Z1010
SMS Centre Number	It is possible to pre-record the SMS Centre Number.
Pictures	It is possible to insert a picture or an icon into the text message. EMS compliant mobile handsets will be able to see the picture correctly.
Input methods	Predictive text input and multitap.
Reply to messages	It is possible to reply to received messages by MMS, SMS, phonecall or E-mail.
Message creation methods support	Predictive writing and multitap.
Copy, cut and paste words	No

Feature	Support in the Z1010
Teaching of predictive words that are not in the predictive dictionary	Yes
Possibilities when creating a message:	
save a sent message in a "sent items" folder	Yes
insert a line in the message	Yes
assign a validity period to the message	Yes
print via IrDA	No
use pre-defined messages	Yes
Possibilities when receiving a message:	
reply to the sender	Yes (only to the sender, not to all or part of the message recipients)
forward the message	Yes
save the message on SIM	Yes
get delivery time and date	Yes
print via IrDA	No
Possibilities of the previously sent message:	
delivery report of the message	Yes
forward the message	Yes
save the message on SIM	Yes
know the remaining capacity storage	Yes
print via IrDA	No
Possibilities of the previously received message:	
reply to the sender	Yes (only to the sender, not to all or part of the message recipients)
save the message in the Inbox	Yes
forward the message	Yes
know the remaining capacity storage	Yes
Supported ways for replying to a received SMS:	
via SMS	Yes
via phone call (set up a call to the number contained in the message body)	Yes

Feature	Support in the Z1010
via WAP call (go to the WAP address contained in the message body)	Yes
via USSD session	No
Possibility to offer the user the ability of sending an SMS to a list of recipients	Yes, using phonebook groups
Possibility to write an e-mail address as a recipient address	Yes, if SMS type=e-mail
SMS storage	In the SIM and in the handset.
Nokia Picture Messaging	Yes

Enhanced message service

Feature	Support in the Z1010
Level of compliance supported by the handset regarding the specifications described in release 99.	Enhanced Messaging Service (EMS) according to the standard 3GPP TS 23.040 v4.3.0, with the addition of the ODI feature from 3GPP TS 23.040 v5.0.0.
Number of messages that the handset is able to handle to generate a concatenated message	10
Capacity storage	30 or more depending on space left on SIM.
Outgoing messages	It is possible to... • see how many short messages an EMS message consists of before sending it. • choose whether to send the message or not after writing it.
Incoming messages	• A signal is heard once all parts of the message have been received or when a timeout occurs. • It is possible to re-use the content of an EMS message. Sounds, pictures, and animations can be inserted in a new message, if the object is not protected using ODI.
Concatenated messages	A receipt is received in the handset when all parts of a concatenated message have been delivered.
Insert objects	It is possible to add pictures, animations and sounds to an EMS message.
Text formatting	• Centred, left and right aligned text. • Small, normal and large font size. • Bold, italic, underlined and strikethrough style.

Feature	Support in the Z1010
Sounds	Chimes high, chimes low, ding, tada, notify, drum, claps, fanfare, chords high, chords low.
I-melody	Yes, version 1.2.
Melodies	It is possible to... • send and receive melodies via EMS, if the melodies are not protected by copyright. • download melodies and commercial tunes from WAP/WAP portals. • create melodies on WAP/WAP portals.
WBMP	Yes
Picture sizes	16 x 16 mm, 32 x 32 mm, variable size in black and white.
Pictures	It is possible to... • edit pictures by using the phone keypad. • send and receive pictures via EMS, if the pictures are not protected by copyright. • create pictures on WAP/WAP portals. • download pictures from WAP/WAP portals. • receive pictures in enhanced messages originated by service providers.
Animations	The handset supports the following animations: I am ironic, I am glad, I am sceptic, I am sad, WOW!, I am crying. Plus the other nine animations defined in 23.040 v4.3.0. It is possible to... • send and receive animations.
TP-PID field value given by the handset before sending an EMS message	0x00

Multimedia message service

Feature	Support in the Z1010
MMS/CSD parameters and MMS/GPRS parameters placement	MMS is bound to a WAP profile. A WAP profile is bound to a Data Account. A Data Account contains either CSD parameters or GPRS parameters.
Possibility to pre-configure the MMS parameters in factory	• MMS/CSD: Yes • MMS/GPRS: Yes
Possibility to configure the MMS parameters by OTA provisioning	• MMS/CSD: Yes • MMS/GPRS: Yes

Feature	Support in the Z1010
Possibility for all the parameters from the parameters set to be OTA provisioned at the same time	• MMS/CSD: Yes • MMS/GPRS: Yes
Possibility for only one parameter from the parameters set to be OTA provisioned	• MMS/CSD: No • MMS/GPRS: No
OTA provisioning solution	OTA specified by Ericsson and Nokia
MMS User Agent functional entity will be a separate entity from WAP browser:	Yes
MMS User Agent support	WAP WTA, WAP UAProf and WTA Public.
Supplier indication of realized interoperability tests between its MMS User Agent and MMS Relay/Server from other suppliers	Yes
Support of a standard or a proprietary procedure for OTA provisioning of MMS parameters	Proprietary
Functionalities that the user is able to set during message composition:	• message *subject* • MSISDN recipient address • *e-mail* recipient address • message *Cc* recipient(s) address(es) • *delivery report* request • *read-reply* report request • *message* priority
From where can the user insert multimedia elements into multimedia messages:	• terminal memory • directly from camera
Supplier indication if MMS User Agent will be able to handle a network-based address book	No
Possibility for sent messages to be memorized into a folder in handset memory	Yes
Actions that the user can perform after message notification:	• retrieve the message immediately • defer message retrieval • reject message
Actions that the user can perform after message retrieval:	• reply to the sender of the message • reply to the sender and to Cc people • forward the message • delete the message • save message into terminal
Multimedia codecs/formats supported for audio	AMR, MP3, AAC, WAV
Multimedia codecs/formats supported for video	MP4, H263

Feature	Support in the Z1010
Multimedia codecs/formats supported for image	Baseline JPEG, wbmp, GIF 89a
MMS User Agent provides:	• text formatting facilities (only text size) • coloured text/background (Viewer/player supports coloured text and background.) • predictive writing
Supported formats for message presentation:	• message body + attachments (e-mail presentation) • SMIL version as described in "Nokia/Ericsson MMS Conformance document (not WML and SMIL 2.0 Boston)
Maximum message size that can be handled by the handset for message	Unlimited
Possibility to configure unconditional message modification (such as media modification in messages)	Yes
MMS User Agent will report problems to user in case of:	• message not sent causes no user subscription to service, if included in ResponseText (please see WAP209) • message not sent causes required functionality not supported by MMS Relay/Server, if included in ResponseText (please see WAP209) • message not sent causes insufficient credit (in case of prepaid charging), if included in ResponseText (please see WAP209)

Speech coding

Dimension	Full rate	Enhanced full rate
Type	RPE/LPC with LTP, AMR	ACELP, AMR
Bit rate	13.0 kbps	12.2 kbps
Frame duration	20 ms	20 ms
Block length	260 bits	244 bits
Class 1 bits	182 bits	
Class 2 bits	78 bits	

Bluetooth technical data

Dimension	Support in the Z1010
Bluetooth capability statement	This phone is manufactured to meet Bluetooth Specification 1.1
Bluetooth functions	Dial-up Networking Profile Generic Access Profile Generic Object Exchange Profile Headset Profile Object Push Profile Serial Port Profile Synchronization Profile Basic Imaging Profile Handsfree Profile File Transfer Profile
Connectable devices	All products supporting Bluetooth spec. 1.1 and at least one of the profiles above.
Coverage area	Varies due to radio performance on remote device and the occurrence of obstacles. Connection with a class 2 device: 20-80 metres outdoors, 10- 50 metres indoors. Connection with a class 1 device: 30- 300 metres outdoors, 15- 80 metres indoors.
Transmission power	32 mW (16-17 dBm)
Frequency band	2.4 GHz - the unlicensed ISM band
Power consumption	GSM/UMTS host processor excluded: Standby, Bluetooth On mode: 0.7 mA . Bluetooth On plus visible: 1.3 mA. Voice mode: 15-70 mA Data mode average: 65-165 mA (depending on distance to remote device) Enhanced Power Control Algorithm: supported to optimize current consumption to lowest possible with kept link quality.
Data transmission rate	Up to 600 kbps asynchronous and up to 350 kbps synchronous from an application level.
Specific commands working with the SIM card	No

SIM AT services supported by the Z1010

Service	Mode	Support
CALL CONTROL		Yes

Service		Mode	Support
CELL BROADCAST DOWNLOAD			Yes
DISPLAY TEXT		Text of up to 240 characters (120 UCS2 coded).	Yes
	bit 1:	0 = normal priority	Yes
		1 = high priority	Yes
	bit 8:	0 = clear message after a delay	Yes
		1 = wait for user to clear message	Yes
GET INKEY		General: The GET_INKEY requires that the user confirms his/her choice	Yes
	bit 1:	0 = digits (0-9, *, # and +) only	Yes
		1 = alphabet set	Yes
	bit 2:	0 = SMS default alphabet	Yes
		1 = UCS2 alphabet	Yes
	bit 3:	0 = character sets defined by bit 1 and bit 2 are enabled	Yes
		1 = character sets defined by bit 1 and bit 2 are disabled and the Yes/No response is requested	Yes
GET INPUT		General: No. of hidden input characters	20
	bit 1:	0 = digits (0-9, *, # and +) only	Yes
		1 = alphabet set	Yes
	bit 2:	0 = SMS default alphabet	Yes
		1 = UCS2 alphabet	Yes
	bit 3:	0 = ME may echo user input on the display	Yes
		1 = user input not to be revealed in any way (see note)	Yes
	bit 4:	0 = user input to be in unpacked format	Yes
		1 = user input to be in SMS packed format	Yes
	bit 8:	0 = no help information available	Yes
		1 = help information available	No
LAUNCH BROWSER			Yes
MORE TIME			Yes
PLAY TONE			Yes

Service	Mode		Support
POLLING OFF			Yes
POLL INTERVAL			Yes
PROVIDE LOCAL INFORMATION	'00' = Location Information (MCC, MNC, LAC and Cell Identity)		Yes
	'01' = IMEI of the ME		Yes
	'02' = Network Measurement results		Yes
	'03' = Date, time and time zone (DTTinPLI)		Yes
	'04' - Language setting		Yes
	'05' - Timing setting		Yes
REFRESH	General: The reset option requests the user to wait while the phone restarts		Yes
	'00' =SIM Initialization and Full File Change Notification		Yes
	'01' = File Change Notification		Yes
	'02' = SIM Initialization and File Change Notification		Yes
	'03' = SIM Initialization		Yes
	'04' = SIM Reset		Yes
SELECT ITEM			Yes
SEND DTMF			Yes
SEND SHORT MESSAGE	bit 1:	0 = packing not required	Yes
		1 = SMS packing by the ME required	Yes
SEND SS			Yes
SEND USSD			Yes

Service	Mode	Support
SET UP CALL	General: Capability configuration	Yes
	Set-up speech call CallParty Subaddress DTMF support	No
		Yes
	'00' = set up call, but only if not currently busy on another call	Yes
	'01' = set up call, but only if not currently busy on another call, with re-dial	Yes
	'02' = set up call, putting all other calls (if any) on hold	Yes
	'03' = set up call, putting all other calls (if any) on hold, with re-dial	Yes
	'04' = set up call, disconnecting all other calls (if any)	Yes
	'05' = set up call, disconnecting all other calls (if any), with re-dial	Yes
SET UP EVENT LIST	'00' = MT call	Yes
	'01' = Call connected	Yes
	'02' = Call disconnected	Yes
	'03' = Location status	Yes
	'04' = User activity	No
	'05' = Idle screen available	Yes
	'06' = Card reader status	Not Applicable
	'07' = Language selection	Yes
	'08' = Browser termination	Yes
	'09' = Data available	No
	'OA' = Channel status	No
SET UP IDLE MODE TEXT		Yes, 1 row of text is supported
SET UP MENU		Yes
SMS PP DOWNLOAD		Yes
TIMER MANAGEMENT		Yes
OPEN CHANNEL		Yes
CLOSE CHANNEL		Yes

Service	Mode	Support
RECEIVE DATA		Yes
SEND DATA		Yes
GET CHANNEL STATUS		Yes

User Interaction with SIM AT

Display text
Text of up to 240 characters (120 UCS coded) is supported.

Text clearing times are 5-20 seconds and a 60-second time-out limit for the user to clear the text. 'Key' responses:

- 'Long Back' – Proactive session terminated by user.
- 'Back' – Backward move in proactive session.

Any other key clears screen if the command is performed successfully.

Get inkey
Prompt for a one-character input. Pressing 'Ok' without entering a character gives warning message "Minimum 1 character". 'Key' responses:

- 'C' clears current character.
- 'Long Back' terminates the proactive session.
- 'Back' – Backward move in proactive session.
- 'OK' – Command performed successfully.

Get input
Prompt for character input. The phone will refuse to accept further input when maximum response length is exceeded. MMI Maximum Response lengths:

- Digits Only – 160 characters
- SMS default alphabet characters – 160 characters
- Hidden Characters (digits only) – 20 characters

'Key' responses:

- 'C' clears current character.
- 'Long Back' terminates the proactive session.
- 'Back' – Backward move in proactive session.
- 'OK' – Command performed successfully.

Refresh
When a refresh command is executed by the phone, it requests the user to wait while the phone restarts. A notification will be made if it is demanded that the SIM card initializes again.

Select item
Scroll to highlight item for selection. 'Key' responses:

- Joystick press down – Scroll down list.
- Joystick press up – Scroll up list.
- Long 'Back' terminates proactive session.
- 'Back' – Backward move in proactive session.
- 'OK'– Command performed successfully.

Send short message
Default message "Sending message, please wait" can be replaced for the Alpha Identifier text, or suppressed completely if a null text is provided. Default responses are "MESSAGE FAILED" or "MESSAGE SENT". 'Key' responses:

- Long 'Back' or 'Back' ends the proactive session.

Set up call
If the ME is on a call when the command 'Set up Call', 'putting all other calls on hold' is sent, the user will see the text 'Setting up a call current call will be held'. If 'OK' is pressed the current call will be put on hold and the new call set up. If the ME is on a call when the command 'Set Up Call, disconnecting all other calls' is sent, the user will see the text 'Setting up a call current call will be disconnected'. If the 'OK' key is pressed the current call will be disconnected and the new call set up.

Set up menu
Incorporates a SIM Application Toolkit Menu Item into the ME's main menu structure. In standby, the right or left arrow buttons can be pressed to select the Menu Items.

If an Alpha Identifier is supplied in the Set Up Menu command, this is used as the SIM AT entry in the ME's main menu. If no alpha identifier is supplied and several items are found in the menu, a default title is used. If the SIM AT Menu Item is selected by pressing 'Select', all the items sent in the Set Up Menu command will be available for selection, in the same way as the Select Item command.

WAP browser technical data

Feature	Support in the Z1010 browser
Back to previous page	Yes
Bearer type GPRS (IP)	Yes
Bearer type GSM Data (IP)	Yes, HSCSD, ISDN and analog
Bookmarks	Yes, up to 25 named bookmarks for easy access to frequently visited pages
Bookmark Export/Import	Yes, can be sent and received as link using SMS and vBookmark format via IR and BT
Cache	Yes (size 100 KB)
Character sets *	UTF-8 (Default), UTF-16, USASCII, Latin1, UCS2
Clear cache	Yes
Colour	Colour display
Home page	Yes, up to 5 different, one for each WAP profile
HTML version for WAP browser	xHTML, mobile profile
Hyperlinks in Text	Yes, highlighted by inverse video
Hyperlinks in Images	Yes, indicated by a frame
Image Animation	No
Image Formats	GIF (interlaced and non-interlaced) WBMP, no transparent layers, JPEG, PNG
Network Settings	Up to 5 different settings available by selecting WAP profile (Intranet, Internet, Banking, Gateway etc.)
OTA Support	Yes
PPP Authentication	PAP, CHAP supported
Reload page	Yes
Security	WTLS class 1-3 TLS 1.0, client authentication WIM on SIM ICC X.509 certificate support, WAP Profile WMLScript signText WPKI OTA download of trusted and client certificates

Feature	Support in the Z1010 browser
Tables	Yes
User Agent Profiles	Yes, list of client characteristics - for example display size
WAP/WML WAP	WAP 2.0/WML 1.3
	*) When creating WML applications, it is recommended that you always save the page contents as UTF-8, and that this is clearly indicated in the pages before publishing. This ensures that the contents of the application can be viewed, regardless of character sets used in gateways and the phone. All characters are not supported in all phones. The software version depends on which market the phone is associated to. Also, please note that the phone may not support input on a WAP Service which uses certain characters (languages), even if those characters are supported for browsing in the phone.
WAP browser	WAP 2.0
WAP profiles	Dynamic - up to 5 WAP profiles, each with its own settings

WAP operator technical data

Feature	Support in the Z1010 for WAP	
WAP Browser		
Version	2.0 baseline	
HTML	XHTML, mobile profile	
WAP Provisioning	**The Ericsson-Nokia solution**	**WAP Forum OTA provisioning**
Total Parameter sets	5	5
Parameter set list	name, homepage and homepage title (1st bookmark element), proxy/GW address, bookmarks (remaining bookmark elements), CSD phone number, CSD data rate, CSD dial type, GPRS APN, protocol authentication, GW authentication, secure connection on/off	name, homepage, proxy/GW address, CSD phone number, CSD data rate, CSD dial type, CSD response timer, GPRS APN, protocol authentication, GW authentication, GPRS QoS
Parameter sets include	WAP/CSD, WAP/GPRS (different sets)	
Factory pre-configuration	WAP/CSD (possibility to lock a setting), WAP/GPRS	

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Feature	Support in the Z1010 for WAP	
OTA	WAP/CSD, WAP/GPRS configuration possible	
Security mechanism		
Bearer	**The Ericsson-Nokia solution**	**WAP Forum OTA provisioning**
OTA via SMS	Operator verification through a code that can be included in the OTA configuration data. This code is shown to the user who can choose installation or not.	Uses security mechanism (SEC) methods according to WAP-183-ProvCont-20010724-a (see www.openmobilealliance.org).
OTA via Cell Broadcast	-	According to ch.7.1.2, WAP-184-ProvBoot-20010314-a (see www.openmobilealliance.org).
Interface		
Bearer	**The Ericsson-Nokia solution**	**WAP Forum OTA provisioning**
OTA via SMS	A question whether to install, with the code if available is asked. The user may have to choose if to create a new WAP profile or to replace an existing WAP profile.	For NETWPIN the user is asked to accept to install received settings. For USERPIN, USERNETWPIN and USERPINMAC the user is subsequently asked to enter a PIN code that is a shared secret between the service provider and the user.
OTA via Cell Broadcast	-	The user is asked whether to accept the received settings or not.
Re-provisioning Interface	**The Ericsson-Nokia solution**	**WAP Forum OTA provisioning**
OTA via SMS	Same interface as above.	If the settings previously installed were privileged or has higher priority the settings might not be possible to install again unless the terminal is reset, otherwise as above.
OTA via Cell Broadcast	-	If the settings previously installed were privileged or has higher priority the settings might not be possible to install again unless the terminal is reset, otherwise as above.
Carrier reset/provisioning	Yes, but not if the set is pre-configured in the factory and locked.	

Feature	Support in the Z1010 for WAP
SWIM	Not used for provisioning. The SWIM is only used for WAP security, both WTLS connections and digital signatures.
SWIM certificate	Both client and trusted certificates can be used for WTLS connections and digital signatures.
Applicative provisioning	
Preferred bearer customization	Yes
E-mail customization	Yes, but not through WAP provisioning.
Other applications/features	Yes. MMS, SyncML
Technologies	
WAP Forum OTA provisioning	Yes
Openwave OTA	No
Other	Yes. The Ericsson-Nokia solution.
Provisioning bearer	SMS, Cell Broadcast
Parameter sets available	5
Parameter sets for OTA modification	5

PUSH	
Content types	
Service Indication (SI)	Yes
Service Loading (SL)	Yes
Cache Operation (CO) content type	Yes
Session Initiation Application (SIA)	Yes
Man Machine Interface	
SI/content retrieval postponing	Yes
SI menu structure accessability	Messaging, Inbox
SL reception warning	The user can make a choice if a dialogue is wanted or not before loading the SL. Messaging/Settings/Push messages/Allow push msg/Always ask
SIA reception warning	Yes
Cache size limitations	If the inbox is full and a new push is received, the oldest push in the inbox will be discarded.

Feature	Support in the Z1010 for WAP
Number of push messages	Depending on the size of the push messages. Around 20 push messages with a size of 500 bytes can be stored.
Push de-activate	Yes. Messaging/Settings/Push
Dynamic push menu changes	No. There are no changes in the menus when activating/deactivating push
Security	
Mechanisms for push	None
Trust with PPG	Sending a SIA is the most trustful.
WSP push sessions	1
Denial of service/spoofing	
User agent profile	
UA profile content sent at beginning of WSP session	No
OA profile content size	
URL sent pointing to the UA profile at the beginning of WSP session	Yes
URL location	On the manufacturer WAP site.
WTAI	
WTA Make Call	Yes
WTA Send DTMF	Yes
WTA Add Phone Book	Yes
Other WTA/WTAI	No

DOWNLOAD	
WAP solutions	
SAR/WSP/HTTP GET solution to download content over WAP	Yes
Download Fun from Openwave	No
Other download content over WAP	Yes. Content download limited to 200 KB when using WTP protocol. No download limit when using HTTP protocol.
Features	
Download application/product memory check	Yes
Downloaded object solution	Yes. The user is asked if the content is to be saved.

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Feature	Support in the Z1010 for WAP
UAP indication for downloading	Yes
Other features	Yes. Store, delete, forward, use, manage.
Object formats	
Ringing tones	audio/iMelody, other/eMelody, vMel.
Wallpapers	Image/WBMP, GIF, JPEG.
Pictures	Image/WBMP, GIF, JPEG, PNG.
Games	Yes
JAVA applications	Yes
Screen savers	Image/GIF, JPEG
Audio files	WAV not used
Skins	Application/skin
Video	
GRAPHICAL USER INTERFACE	
Man Machine Interface	
Selection keys	Yes
Separate/dedicated back or erase keys	Yes
Screen backlight on when browsing	Yes
Predictive writing	Yes
"http://" string displayed automatically when entering URLs	Not displayed but the "http://" is added automatically to the URL.
Elements	
Number of display lines for a WAP connection	4 to 7 plus Title.
Pop-up menus	Yes, in XHTML
Radio buttons	Yes, in XHTML.
Check boxes	Yes, in XHTML.
Buttons	Available as XHTML form controls.

WAP provisioning

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	The Ericsson-Nokia solution	WAP Forum OTA provisioning
Total parameter sets	5	5
Parameter cell list	name, homepage and homepage title (1st bookmark element), proxy/GW address, bookmarks (remaining bookmark elements), CSD phone number, CSD data rate, CSD dial type, GPRS APN, protocol authentication, GW authentication, secure connection on/off	name, homepage, proxy/GW address, CSD phone number, CSD data rate, CSD dial type, CSD response timer, GPRS APN, protocol authentication, GW authentication, GPRS QoS

USSD technical data

Feature	Support in the Z1010
USSD support	GSM Phase 1/2 (Cross-phase compatibility). GPRS behavior according to class B.
Mode support -mode	MMI-mode supported. SAT initiated USSD supported.
MMI-mode details	• USSD messages disappear after time out. • It is possible to scroll the text up and down in USSD messages. • It is possible to highlight embedded numbers and take actions accordingly.

GPRS technical data

Dimension	Support in the Z1010
Compatible GPRS and SMG specifications	3GPP R99 December 2002
Data rates	Multislot class 8 supported (4+1) CS-1, CS-2, CS-3, CS-4 9,050 bps, 13,400 bps, 15,600 bps, 21,400 bps supported (network-dependent)
Medium Access Modes	Fixed and dynamic allocation
Support of Packet Control Channels (PBCCH/PCCCH)	Yes. Available at launch.

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Dimension	Support in the Z1010	
Network operation mode	NOM I, II, III	
Support of GPRS/CS combined procedures	Yes	
Network control mode	NC0, 1 and 2	
Support of access in 2 phases	Yes	
Support of PRACH on 11 bits	Yes	
Support of GPRS re-selection C31/C32	Yes	
Support of static and dynamic addressing	Yes	
Support of power control Uplink and Downlink	Uplink = yes, Downlink is a network feature	
Support of ciphering algorithms	GEA1, GEA2	
Support of compression algorithms	Yes, V42bis and IP header compression	
Mode of operation	Class B and Class C modes of operation supported.	
R Reference point	Physical layer: Support of RS232 PPP is supported as L2 layer in the R reference point Authentication algorithms PAP, CHAP supported	
IP connectivity	PDP type IP is supported IP termination in mobile or TE (laptop, PDA) supported	
PDP context	10 PDP context descriptions stored in mobile PDP context description is edited via application in mobile, AT-command or via OTA Simultaneous PDP contexts are supported	
SIM	GPRS aware, as well as non-GPRS aware; SIM cards are supported.	
AT commands supported	AT+CGDCONT - DEFINE PDP CONTEXT AT+CGQREQ - Quality of Service Profile (REQUESTED) AT+CGQMIN - Quality of Service Profile (Minimum Acceptable) AT+CGATT - PACKET DOMAIN SERVICE ATTACH OR DETACH	AT+CGACT - PDP CONTEXT ACTIVATE OR DEACTIVATE AT+CGDATA - ENT

SyncML technical data

Feature	Support for Sync ML in the Z1010
SyncML compliance	The handset is fully SyncML compliant (it passed SyncML Conformance testing).
Basic data formats	Contacts: vCard 2.1, Calendar: vCalendar 1.0, Tasks: vTodo 1.0, Notes: text/plain.
Possibility for operators to extend SyncML functionality	No
Possibility to synchronize other handsets using SyncML	No
Transport method for SyncML messages	WSP (i.e. using a WAP connection), HTTP, OBEX (RS232, IR, USB, Bluetooth).
Synchronization application placement	Inside the handset
Possibility for the user to configure login parameters (e.g. username and password) to access the remote database	Yes
Configuration parameters that can be entered/modified by the user	Server URL, Server UserID, Server PWD, Paths to databases (Calendar, Contacts, Tasks) UserID and PWD for Databases, Databases to be synched (on/off), WAP Account.
Mechanisms used by the handset to capture changes made by the end user (i.e. how does the SyncML client in your handset know which changes were made to the address book)	It uses a change log where it marks the contact as updated
Ability to deal with multiple servers	Yes
Ability to perform conflict resolution actions	No

Terminology and abbreviations

3GPP
3rd Generation Partnership Project.

AMR
Adaptive Multi Rate. Audio format for speech sounds.

API
Application Programming Interface.

Bearer
The method for accessing WAP from the phone, for example GSM Data (CSD) and SMS.

Bookmark
A URL and header/title stored in the phone.

Browsing session
The period from the first access of content until the termination of the connection.

Calling Line Identification (CLI)
Shows the number of the caller, or a picture assigned to the number of the caller in the mobile phone display. Not all numbers can be displayed. Network-dependent service.

Card
A single WML unit of navigation and user interface. May contain information to present to the user, instructions for gathering user input, etc.

CDMA
Code Division Multiple Access. A generic term that describes a wireless air interface based on code division multiple access technology.

CS
Circuit Switched.

CSD
Circuit Switched Data.

Deck
A collection of WML cards.

DRM
Digital Rights Management; controlling copying and distribution of contents, with respect to intellectual property rights.

DTMF or Touch Tone
Dual Tone Multi-Frequency signal – codes sent as tone signals. Used for telephone banking, accessing an answering machine, etc.

Dual band
GSM 900/1800.

e-GSM
Extended GSM. New frequencies specified by the European Radio Communications Committee (ERC) for GSM use when additional spectrum is needed (Network-dependent). It allows operators to transmit and receive just outside GSM's core 900 frequency band. This extension gives increased network capability.

EDGE
Enhanced Data rates for Global Evolution. EDGE uses a new modulation schema to enable data throughput speeds of up to 384kbps using existing GSM infrastructure.

EFR
Enhanced Full Rate, speech coding.

EMS
Enhanced Messaging Service. Allows the user to add simple pixel pictures and animations, sounds and melodies to a text message. The EMS 3GPP standard also includes text formatting.

ETSI
European Telecommunications Standards Institute.

FR
Full Rate, speech coding.

Gateway
A WAP Gateway typically includes the following functions:

- A Protocol Gateway – the protocol gateway translates requests from the WAP protocol stack to the WWW protocol stack (HTTP and TCP/IP).
- Content Encoders and Decoders – the content encoders translate Web content into compact encoded formats to reduce the size and number of packets travelling over the wireless data network.

GIF
Graphics Interchange Format.

GPRS
General Packet Radio Services.

GSM
Global System for Mobile Communications. GSM is the world's most widely-used digital mobile phone system, now operating in over 100 countries around the world, particularly in Europe and Asia-Pacific.

GSM system
The GSM system family includes GSM 900, GSM 1800 and GSM 1900. There are different phases of roll-out for the GSM system and GSM phones are either phase 1 or phase 2 compliant.

GSM 1800
Also known as DCS 1800 or PCN, this is a digital network working on a frequency of 1800 MHz. It is used in Europe and Asia-Pacific.

HR
Half Rate, speech coding.

HSCSD
High Speed Circuit Switched Data.

HTML
HyperText Markup Language.

HTTP
HyperText Transfer Protocol.

IrMC
Infrared Mobile Communications standard.

IrDA
Infrared Data Association.

ISP
Internet Service Provider.

ITTP
Intelligent Terminal Transfer Protocol.

LED
Light Emitting Diode.

LAN
Local Area Network.

ME
Mobile Equipment.

Micro browser
Accesses and displays Internet content in a mobile phone, using small file sizes and the bandwidth of the wireless-handheld network.

MMI
Man-Machine Interface.

MP3
Short for "MPEG layer 3", an effective audio coding scheme.

MS
Mobile Station.

MT
Mobile Termination.

ODI
Object Distribution Indicator.

OMA
Open Mobile Alliance.

OTA
Over-the Air Configuration. To provide settings for the phone by way of sending an SMS message over the network to the phone. This reduces the need for the user to configure the phone manually.

PDA
Personal Digital Assistant.

PDP
Packet Data Protocol.

Phone book
A memory in the mobile phone or SIM card where phone numbers can be stored and accessed by name or position.

PIM
Personal Information Management.

SMS-C
Service Centre (for SMS).

Service provider
A company that provides services and subscriptions to mobile phone users.

SI
Service Indication.

SL
Service Loading.

SIM card
Subscriber Identity Module card – a card that must be inserted in any GSM-based mobile phone. It contains subscriber details, security information and memory for a personal directory of numbers. The card can be a small plug-in type or credit card-sized, but both types have the same functions. The Z1010 uses the small plug-in card.

SMS
Short Messaging Service. Allows messages of up to 160 characters to be sent and received via the network operator's message centre to a mobile phone.

SS
Supplementary Services.

TCP/IP
Transmission Control Protocol/Internet Protocol.

UMTS
Universal Mobile Telecommunications System. The telecommunications system, incorporating mobile cellular and other functionality, that is the subject of standards produced by 3GPP.

URL
Uniform Resource Locator.
The global address of documents and other resources on the World Wide Web.

USSD
Unstructured Supplementary Services Data.

vCard
vCard automates the exchange of personal information typically found on a traditional business card, for use in applications such as Internet mail, voice mail, Web browsers, telephony applications, call centres, video conferences, PIMs /PDAs, pagers, fax, office equipment, and smart cards. vCard is specified by IETF.

WAP
Wireless Application Protocol. Handheld devices, low bandwidth, binary coded, a deck/card metaphor to specify a service. A card is typically a unit of interaction with the user, that is, either presentation of information or request for information from the user. A collection of cards is called a deck, which usually constitutes a service.

WAP Application
A collection of WML cards, with the new context attribute set in the entry card.

WAP service
A WML application residing on a web site.

WBMP
Wireless BitMap.
A graphic format optimized for mobile computing devices.

WML
Wireless Markup Language. A markup language used for authoring services, fulfilling the same purpose as HyperText Markup Language (HTML) does on the World Wide Web (WWW). In contrast to HTML, WML is designed to fit small handheld devices.

WMLScript
WMLScript can be used to enhance the functionality of a service, just as, for example, Java Script may be utilized in HTML. It makes it possible to add procedural logic and computational functions to WAP-based services.

WSP
Wireless Session Protocol.

WTLS
Wireless Transport Layer Security.

WWW
World Wide Web.

XML
Extensible Markup Language.

XHTML
Extensible HyperText Markup Language.

Related information

Documents

- The Z1010 User Guide
- Sony Ericsson Z1010 FAQ
- AT Command Reference Manual
- WAP June2000 (WAP 1.2.1) Specification

Links

- www.SonyEricsson.com
- www.SonyEricsson.com/fun/
- www.SonyEricsson.com/developer/
- www.ericsson.com/mobilityworld/
- www.gprsworld.com
- www.midi.org
- www.extendedsystems.com
- www.bluetooth.com
- www.imc.org
- www.3gpp.org
- www.irda.org
- www.etsi.fr
- www.wapforum.org
- www.imc.org/pdi/
- www.syncml.org
- www.w3.org/TR/xhtml-basic/
- www.memorystick.org
- www.memorystick.com
- www.java.sun.com

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